

**SUBJECT:** Detroit, MI GMAP Air Monitoring

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**DATES OF FIELD  
MONITORING:**

August 22-23, 2017

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**DETROIT, MI GMAP MONITORING**

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## DETROIT, MI GMAP MONITORING

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## DETROIT, MI GMAP MONITORING

### Methods:

US EPA Region 5's (R5) Geospatial Monitoring of Air Pollution (GMAP) uses a Picarro G2204 cavity ringdown spectroscopy (CRDS) analyzer, SN 2267-BFADS2013. The data are integrated with global positioning system location information and meteorological parameters when available to quantify air pollutant concentrations. Additionally, the GMAP uses a DUVAS Model DV3000 SN UV3000-2016067-DV1019 to collect BTEX, m-o-p xylene, styrene, formaldehyde, and SO<sub>2</sub> ambient air concentration data. Additional information can be found in the SOP (R5-ARD-0002-r3 GMAP ) Quality Assurance Project Plan (v4.0 2017-05-30).

The monitored H<sub>2</sub>S concentrations are compared to health screening levels, including CalEPA's 1 hr H<sub>2</sub>S acute risk exposure limit (REL, 30 ppb) and ATSDR's 1-14 day minimum risk limit (MRL, 70 ppb), and other values as applicable.

USEPA R5 monitored to evaluate the ambient air concentrations of hydrogen sulfide, methane, benzene, toluene, ethylbenzene, m-o-p xylene, sulfur dioxide, styrene, and formaldehyde around facilities in Detroit August 22-23, 2017.

The mobile nature of transects provides data in real time over a geographic area, serving as a screening tool, identifying areas with potential fugitive emissions. Stationary measurements are taken at one geographic location over a period of time, lending itself more to comparison to threshold levels.

Concentrations above the detection limit were measured for all parameters. Tables 1-4 depict the maximum 1-second measured concentrations for each day. Tables 5-8 depict the number of observations and length of time the concentrations were above health screening levels for each driven transect and stationary measurement for hydrogen sulfide, methane, and benzene.

**DETROIT, MI GMAP MONITORING**

date	mobile transects	H2S (ppb)	CH4 (ppm)	BEN (ppb)	TOL (ppb)	ETB (ppb)	XYO (ppb)	SO2 (ppb)	STY (ppb)	FOR (ppb)
8/22	Detroit01	<MDL	<MDL	7.92	29.96	<MDL	16.69	4.26	2.77	180.86
8/22	Detroit02	<MDL	<MDL	13.27	29.01	<MDL	17.66	5.31	4.25	195.64
8/22	Detroit03	<MDL	20.49	6.83	30.43	<MDL	<MDL	2.30	2.17	174.68
8/22	Detroit04	<MDL	16.48	8.28	32.97	<MDL	16.29	<MDL	2.61	270.30
8/22	Detroit05	<MDL	<MDL	10.86	35.08	<MDL	<MDL	3.64	3.87	199.18
8/22	Detroit06	<MDL	<MDL	14.04	37.68	<MDL	22.29	2.32	5.44	208.89
8/22	Detroit07	<MDL	<MDL	6.89	26.80	<MDL	<MDL	<MDL	1.86	196.11
8/22	Detroit08	<MDL	<MDL	10.17	34.36	<MDL	<MDL	2.50	2.87	140.09
8/22	Detroit09	<MDL	<MDL	12.69	29.94	<MDL	16.13	2.85	2.88	176.91
8/22	Detroit10	<MDL	<MDL	7.29	22.28	<MDL	16.55	<MDL	2.04	142.92
8/22	Detroit11	14.77	<MDL	20.08	26.43	<MDL	26.70	4.35	5.36	217.95
8/22	Detroit12	120.35	<MDL	12.60	31.08	12.16	32.23	2.23	4.26	210.23
8/22	Detroit13	86.71	<MDL	9.67	24.19	<MDL	18.76	2.90	3.12	150.00
8/22	Detroit14	251.05	<MDL	10.54	39.27	<MDL	17.54	5.61	2.82	203.22
8/22	Detroit15	<MDL	<MDL	9.49	29.36	<MDL	<MDL	2.38	3.94	164.59
8/22	Detroit16	<MDL	<MDL	22.37	31.61	<MDL	17.18	2.55	5.06	180.50
8/22	Detroit17	<MDL	<MDL	9.97	24.39	<MDL	<MDL	<MDL	<MDL	169.36
8/22	Detroit18	<MDL	<MDL	45.94	27.84	19.60	20.60	2.63	14.88	232.76
8/22	Detroit19	26.20	<MDL	58.55	25.95	22.80	<MDL	23.34	19.02	164.21
8/22	Detroit20	<MDL	<MDL	7.06	25.36	<MDL	<MDL	4.90	2.84	177.85
8/22	Detroit21	<MDL	<MDL	8.88	22.83	<MDL	<MDL	3.50	3.30	185.09
8/22	Detroit22	26.97	<MDL	12.16	25.94	<MDL	<MDL	5.01	4.03	194.72
8/22	Detroit23	<MDL	<MDL	24.65	25.21	11.23	18.21	3.06	7.42	209.19
8/22	Detroit24	56.90	<MDL	19.51	32.98	<MDL	25.74	6.55	5.73	246.01
8/22	Detroit25	<MDL	<MDL	20.59	27.91	<MDL	24.40	2.91	5.28	207.64
8/22	Detroit26	14.17	<MDL	19.00	30.89	<MDL	18.49	49.52	5.57	231.44
8/22	Detroit27	16.65	<MDL	20.57	26.86	<MDL	20.86	13.16	6.29	203.62
8/22	Detroit28	<MDL	<MDL	28.51	22.88	9.47	<MDL	5.75	8.77	196.03
8/22	Detroit29	<MDL	<MDL	25.34	27.75	<MDL	23.73	4.18	7.17	239.57
8/22	Detroit30	<MDL	<MDL	14.43	21.80	<MDL	23.72	4.80	3.95	180.58
8/22	Detroit31	<MDL	<MDL	22.65	34.82	<MDL	<MDL	3.93	8.11	207.39
8/22	Detroit32	<MDL	2.26	16.72	31.26	<MDL	<MDL	10.93	5.40	220.41

Table 1:Max Value Table - Mobile Transects 08/22/17

## DETROIT, MI GMAP MONITORING

date	mobile transects	H2S (ppb)	CH4 (ppm)	BEN (ppb)	TOL (ppb)	ETB (ppb)	XYO (ppb)	SO2 (ppb)	STY (ppb)	FOR (ppb)
8/23	Detroit01	<MDL	<MDL	48.74	<MDL	33.00	33.20	<MDL	19.41	<MDL
8/23	Detroit02	<MDL	<MDL	25.60	15.17	<MDL	<MDL	<MDL	12.11	92.45
8/23	Detroit03	24.74	<MDL	13.64	23.61	<MDL	<MDL	<MDL	5.40	87.67
8/23	Detroit04	<MDL	<MDL	12.22	13.65	<MDL	<MDL	<MDL	4.51	119.85
8/23	Detroit04	<MDL	<MDL	12.22	13.65	<MDL	<MDL	<MDL	4.51	119.85
8/23	Detroit06	13.39	<MDL	11.67	38.57	<MDL	<MDL	<MDL	3.91	129.63
8/23	Detroit07	<MDL	<MDL	7.19	12.62	<MDL	<MDL	<MDL	1.83	<MDL
8/23	Detroit08	<MDL	<MDL	13.29	19.93	<MDL	<MDL	<MDL	4.41	133.34
8/23	Detroit09	<MDL	<MDL	36.27	16.81	<MDL	<MDL	<MDL	15.03	81.50
8/23	Detroit10	<MDL	<MDL	21.93	13.22	<MDL	<MDL	3.32	9.16	139.74
8/23	Detroit11	29.84	<MDL	27.78	12.85	<MDL	<MDL	50.46	9.45	106.32
8/23	Detroit12	<MDL	<MDL	15.50	11.48	<MDL	<MDL	6.15	5.63	<MDL
8/23	Detroit13	25.43	<MDL	34.05	15.69	<MDL	<MDL	14.14	15.18	172.16
8/23	Detroit14	<MDL	<MDL	13.93	15.84	<MDL	<MDL	3.96	4.73	88.55
8/23	Detroit15	<MDL	<MDL	9.81	15.27	<MDL	<MDL	<MDL	3.13	111.33
8/23	Detroit16	<MDL	110.64	14.54	13.36	<MDL	<MDL	<MDL	4.77	94.20
8/23	Detroit17	<MDL	120.84	16.11	17.10	<MDL	<MDL	2.94	5.31	104.36
8/23	Detroit18	<MDL	<MDL	12.28	17.37	<MDL	<MDL	6.83	4.48	128.66
8/23	Detroit19	<MDL	<MDL	15.88	16.17	<MDL	<MDL	21.31	7.87	89.85
8/23	Detroit20	<MDL	<MDL	9.45	13.77	<MDL	<MDL	8.36	3.98	104.82
8/23	Detroit21	<MDL	<MDL	53.72	15.25	24.94	<MDL	11.63	23.52	<MDL
8/23	Detroit22	<MDL	<MDL	15.30	<MDL	<MDL	<MDL	73.88	16.50	96.40
8/23	Detroit23	<MDL	<MDL	9.15	<MDL	<MDL	<MDL	4.94	3.84	<MDL
8/23	Detroit24	<MDL	<MDL	27.17	13.89	<MDL	<MDL	4.36	9.89	83.82
8/23	Detroit25	<MDL	<MDL	34.77	20.03	<MDL	<MDL	<MDL	14.71	118.68

Table 2: Max Value Table - Mobile Transects 08/23/17

date	stationary measurement	H2S (ppb)	CH4 (ppm)	BEN (ppb)	TOL (ppb)	ETB (ppb)	XYO (ppb)	SO2 (ppb)	STY (ppb)	FOR (ppb)
8/22	DetroitST01	<MDL	<MDL	13.24	28.60	<MDL	<MDL	<MDL	4.49	186.20
8/22	DetroitST02	<MDL	<MDL	12.26	31.49	<MDL	19.61	2.20	3.51	166.03
8/22	DetroitST03	312.44	<MDL	8.88	29.82	12.23	30.31	6.02	3.13	241.45
8/22	DetroitST04	<MDL	<MDL	15.45	25.51	<MDL	25.08	2.94	3.62	244.01
8/22	DetroitST05	31.76	<MDL	12.52	20.25	<MDL	17.81	52.46	4.78	269.07

Table 3: Max Value Table - Stationary Measurement 08/22/17

**DETROIT, MI GMAP MONITORING**

date	stationary measurement	H2S (ppb)	CH4 (ppm)	BEN (ppb)	TOL (ppb)	ETB (ppb)	XYO (ppb)	SO2 (ppb)	STY (ppb)	FOR (ppb)
8/23	DetroitST01	<MDL	<MDL	11.80	12.11	<MDL	<MDL	<MDL	4.94	108.46
8/23	DetroitST02	<MDL	<MDL	14.40	<MDL	<MDL	<MDL	<MDL	6.85	<MDL
8/23	DetroitST03	<MDL	<MDL	8.03	21.74	<MDL	<MDL	<MDL	3.13	109.72
8/23	DetroitST04	<MDL	<MDL	9.24	18.93	<MDL	<MDL	<MDL	3.11	81.42
8/23	DetroitST05	<MDL	<MDL	8.57	16.87	<MDL	<MDL	<MDL	2.77	<MDL
8/23	DetroitST06	<MDL	<MDL	10.38	17.67	<MDL	<MDL	<MDL	3.88	92.96
8/23	DetroitST07	<MDL	<MDL	10.86	17.15	<MDL	<MDL	5.61	3.02	110.54
8/23	DetroitST08	<MDL	<MDL	13.20	15.08	<MDL	<MDL	<MDL	4.71	102.93
8/23	DetroitST09	<MDL	<MDL	14.26	21.25	<MDL	<MDL	<MDL	4.88	131.70
8/23	DetroitST10	<MDL	<MDL	12.57	17.37	<MDL	<MDL	<MDL	4.38	97.87
8/23	DetroitST11	<MDL	<MDL	10.65	<MDL	<MDL	<MDL	2.21	4.12	107.50
8/23	DetroitST12	<MDL	249.00	10.36	<MDL	<MDL	<MDL	<MDL	3.85	112.04
8/23	DetroitST13	<MDL	<MDL	11.43	11.26	<MDL	<MDL	136.94	19.77	96.78
8/23	DetroitST14	<MDL	<MDL	13.23	10.37	<MDL	<MDL	<MDL	4.35	78.01

Table 4: Max Value Table - Stationary Measurement 08/23/17

## DETROIT, MI GMAP MONITORING

sampling date	transect	H2S (ppb) MAX	N (# of H2S obs >DL)	H2S N>30ppb	# min H2S >30ppb	H2S N>70ppb	# min H2S >70ppb	CH4 (ppm) MAX	N (# of CH4 obs >DL)	# min CH4 >3.86ppm	BEN (ppb) MAX	N (# of BEN obs >DL)	BEN N>9ppb	# min BEN >9ppb	N (seconds)	total minutes sampled
8/22/2017	Detroit01	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	7.92	343	0	0	690	12
8/22/2017	Detroit02	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	13.27	430	12	0	711	12
8/22/2017	Detroit03	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	20.49	48	1	6.83	123	0	0	283	5
8/22/2017	Detroit04	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	16.48	27	0	8.28	251	0	0	438	7
8/22/2017	Detroit05	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	10.86	406	13	0	486	8
8/22/2017	Detroit06	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	14.04	147	27	0	149	2
8/22/2017	Detroit07	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	6.89	65	0	0	69	1
8/22/2017	Detroit08	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	10.17	114	2	0	148	2
8/22/2017	Detroit09	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	12.69	120	20	0	108	2
8/22/2017	Detroit10	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	7.29	31	0	0	35	1
8/22/2017	Detroit11	14.77	6	0	0	0	0	<MDL	<MDL	<MDL	20.08	360	81	1	375	6
8/22/2017	Detroit12	120.35	104	56	1	44	1	<MDL	<MDL	<MDL	12.60	258	48	1	260	4
8/22/2017	Detroit13	86.71	76	49	1	7	0	<MDL	<MDL	<MDL	9.67	66	3	0	76	1
8/22/2017	Detroit14	251.05	76	61	1	46	1	<MDL	<MDL	<MDL	10.54	166	4	0	301	5
8/22/2017	Detroit15	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	9.49	114	1	0	118	2
8/22/2017	Detroit16	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	22.37	379	39	1	525	9
8/22/2017	Detroit17	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	9.97	110	6	0	273	5
8/22/2017	Detroit18	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	45.94	276	75	1	334	6
8/22/2017	Detroit19	26.20	24	0	0	0	0	<MDL	<MDL	<MDL	58.55	270	51	1	439	7
8/22/2017	Detroit20	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	7.06	64	0	0	141	2
8/22/2017	Detroit21	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	8.88	136	0	0	245	4
8/22/2017	Detroit22	26.97	24	0	0	0	0	<MDL	<MDL	<MDL	12.16	329	33	1	546	9
8/22/2017	Detroit23	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	24.65	364	93	2	531	9
8/22/2017	Detroit24	56.90	30	18	0	0	0	<MDL	<MDL	<MDL	19.51	725	351	6	762	13
8/22/2017	Detroit25	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	20.59	505	213	4	508	8
8/22/2017	Detroit26	14.17	5	0	0	0	0	<MDL	<MDL	<MDL	19.00	617	306	5	633	11
8/22/2017	Detroit27	16.65	12	0	0	0	0	<MDL	<MDL	<MDL	20.57	755	473	8	755	13
8/22/2017	Detroit28	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	28.51	153	98	2	153	3
8/22/2017	Detroit29	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	25.34	296	123	2	300	5
8/22/2017	Detroit30	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	14.43	111	44	1	111	2
8/22/2017	Detroit31	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	22.65	74	12	0	767	13
8/22/2017	Detroit32	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	16.72	2184	713	12	2327	39

Table 5: Time Measured Above Benchmark - 08/22/17 Mobile

sampling date	transect	H2S (ppb) MAX	N (# of H2S obs >DL)	H2S N>30ppb	# min H2S >30ppb	H2S N>70ppb	# min H2S >70ppb	CH4 (ppm) MAX	N (# of CH4 obs >DL)	# min CH4 >3.86ppm	BEN (ppb) MAX	N (# of BEN obs >DL)	BEN N>9ppb	# min BEN >9ppb	N (seconds)	total minutes sampled
8/22/2017	DetroitST01	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	13.24	247	47	1	292	5
8/22/2017	DetroitST02	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	12.26	308	28	0	352	6
8/22/2017	DetroitST03	312.44	804	804	13	804	13	<MDL	<MDL	<MDL	8.88	256	0	0	804	13
8/22/2017	DetroitST04	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	15.45	262	153	3	262	4
8/22/2017	DetroitST05	31.76	39	3	0	0	0	<MDL	<MDL	<MDL	12.52	92	33	1	119	2

Table 6: Time Measured Above Benchmark - 08/22/17 Stationary

## DETROIT, MI GMAP MONITORING

sampling date	transect	H2S (ppb) MAX	N (# of H2S obs >DL)	H2S N>30ppb	# min H2S >30ppb	H2S N>70ppb	# min H2S >70ppb	CH4 (ppm) MAX	N (# of CH4 obs >DL)	# min CH4 >3.86ppm	BEN (ppb) MAX	N (# of BEN obs >DL)	BEN N>9ppb	# min BEN >9ppb	N (seconds)	total minutes sampled
8/23/2017	Detroit01	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	48.74	677	294	5	687	11
8/23/2017	Detroit02	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	25.60	647	118	2	691	12
8/23/2017	Detroit03	24.74	18	0	0	0	0	<MDL	<MDL	<MDL	13.64	992	102	2	1030	17
8/23/2017	Detroit04	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	12.22	554	18	0	580	10
8/23/2017	Detroit04	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	12.22	574	36	1	595	10
8/23/2017	Detroit06	13.39	18	0	0	0	0	<MDL	<MDL	<MDL	11.67	738	56	1	771	13
8/23/2017	Detroit07	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	7.19	88	0	0	93	2
8/23/2017	Detroit08	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	13.29	844	162	3	852	14
8/23/2017	Detroit09	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	36.27	452	177	3	454	8
8/23/2017	Detroit10	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	21.93	424	244	4	426	7
8/23/2017	Detroit11	29.84	27	0	0	0	0	<MDL	<MDL	<MDL	27.78	280	127	2	311	5
8/23/2017	Detroit12	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	15.50	216	73	1	216	4
8/23/2017	Detroit13	25.43	12	0	0	0	0	<MDL	<MDL	<MDL	34.05	970	185	3	1025	17
8/23/2017	Detroit14	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	13.93	714	142	2	720	12
8/23/2017	Detroit15	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	9.81	301	6	0	302	5
8/23/2017	Detroit16	<MDL	<MDL	<MDL	<MDL	<MDL	110.64	23	0	14.54	109	41	1	111	2	
8/23/2017	Detroit17	<MDL	<MDL	<MDL	<MDL	<MDL	120.84	77	1	16.11	575	303	5	575	10	
8/23/2017	Detroit18	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	12.28	363	115	2	363	6
8/23/2017	Detroit19	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	15.88	730	248	4	757	13
8/23/2017	Detroit20	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	9.45	426	13	0	442	7
8/23/2017	Detroit21	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	53.72	172	58	1	774	13
8/23/2017	Detroit22	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	15.30	58	38	1	58	1
8/23/2017	Detroit23	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	9.15	37	2	0	37	1
8/23/2017	Detroit24	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	27.17	570	228	4	570	10
8/23/2017	Detroit25	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	34.77	1093	636	11	1093	18

Table 7: Time Measured Above Benchmark - 08/23/17 Mobile

sampling date	transect	H2S (ppb) MAX	N (# of H2S obs >DL)	H2S N>30ppb	# min H2S >30ppb	H2S N>70ppb	# min H2S >70ppb	CH4 (ppm) MAX	N (# of CH4 obs >DL)	# min CH4 >3.86ppm	BEN (ppb) MAX	N (# of BEN obs >DL)	BEN N>9ppb	# min BEN >9ppb	N (seconds)	total minutes sampled
8/23/2017	DetroitST01	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	11.80	1730	18	0	1891	32
8/23/2017	DetroitST02	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	14.40	209	56	1	209	3
8/23/2017	DetroitST03	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	8.03	402	0	0	425	7
8/23/2017	DetroitST04	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	9.24	116	1	0	128	2
8/23/2017	DetroitST05	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	8.57	111	0	0	118	2
8/23/2017	DetroitST06	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	10.38	205	19	0	205	3
8/23/2017	DetroitST07	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	10.86	212	15	0	214	4
8/23/2017	DetroitST08	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	13.20	347	105	2	351	6
8/23/2017	DetroitST09	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	14.26	3006	364	6	3012	50
8/23/2017	DetroitST10	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	12.57	538	36	1	559	9
8/23/2017	DetroitST11	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	10.65	383	58	1	383	6
8/23/2017	DetroitST12	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	249	134	2	10.36	134	46	1	134	2
8/23/2017	DetroitST13	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	11.43	113	24	0	141	2
8/23/2017	DetroitST14	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	13.23	206	58	1	207	3

Table 8: Time Measured Above Benchmark - 08/23/17 Stationary

## DETROIT, MI GMAP MONITORING

The figures below, were created in R, an open-source programming language for statistical computing. The time series demonstrate measured concentrations over individual transects. Ribbons corresponding to each transect represent H<sub>2</sub>S concentrations that are geospatially overlaid on a Google Earth map, illustrating the magnitude of the plume captured during the transect. Stationary measurement allows for several additional analyses. The bivariate polar plot is a function in the R openair statistical package that plots concentration in polar coordinates by wind speed and wind direction. In these plots, the weighted mean of H<sub>2</sub>S concentration (measured by R5's GMAP during stationary collection) \* the frequency of occurrence highlights the wind speed/direction conditions that dominate the overall mean and provides an indication of the source(s). The pollution rose plots pollutant concentrations with wind direction by intervals. These plots can be overlaid on a Google Earth image, with the coordinate origin centered on the GPS coordinates recorded during the stationary data collection. The resulting graphics provides a visual indication of source attribution and identification.

### Results:

Elevated levels of CH<sub>4</sub> were measured in a residential neighborhood, indicative of a natural gas leak; Detroit Edison was contacted through MDEQ to investigate these leaks further and act where appropriate.

During mobile monitoring transect on 08/22/17, elevated levels of H<sub>2</sub>S were measured in the area of Cary and Barnes, downwind from the Detroit Waste Water Treatment Plant (Figure 6 - 16); the maximum H<sub>2</sub>S concentration measured was 251 ppb. The polar plot (Figure 30) depicts the direction of the source to be coming from the Detroit Wastewater Treatment Plant; the maximum concentration of the stationary reading was 312 ppb. All 13 minutes (804 data points) of measurement during this stationary reading were > 70 ppb. On 08/22/17, elevated levels of H<sub>2</sub>S were measured on Miller Road, north of Dix Ave (Figure 17-23), and on 08/23/17, on Dix Ave (Figure 26-27), downwind of Severstall Steel; the maximum H<sub>2</sub>S concentration was 57 ppb. On 08/23/17, H<sub>2</sub>S was measured downwind of a Marathon tank farm (Figure 24-25 and 28-29); the maximum H<sub>2</sub>S concentration was 25 ppb.

A maximum value of 74 ppb of SO<sub>2</sub> was measured downwind of Carmeuse Lime and Stone during a mobile transect on 08/23/17.

While these measured levels did not exceed any health screening levels during this monitoring campaign, they do identify the presence of these pollutants. These data have been shared with the Air Enforcement and Compliance Assistance Branch.

## DETROIT, MI GMAP MONITORING

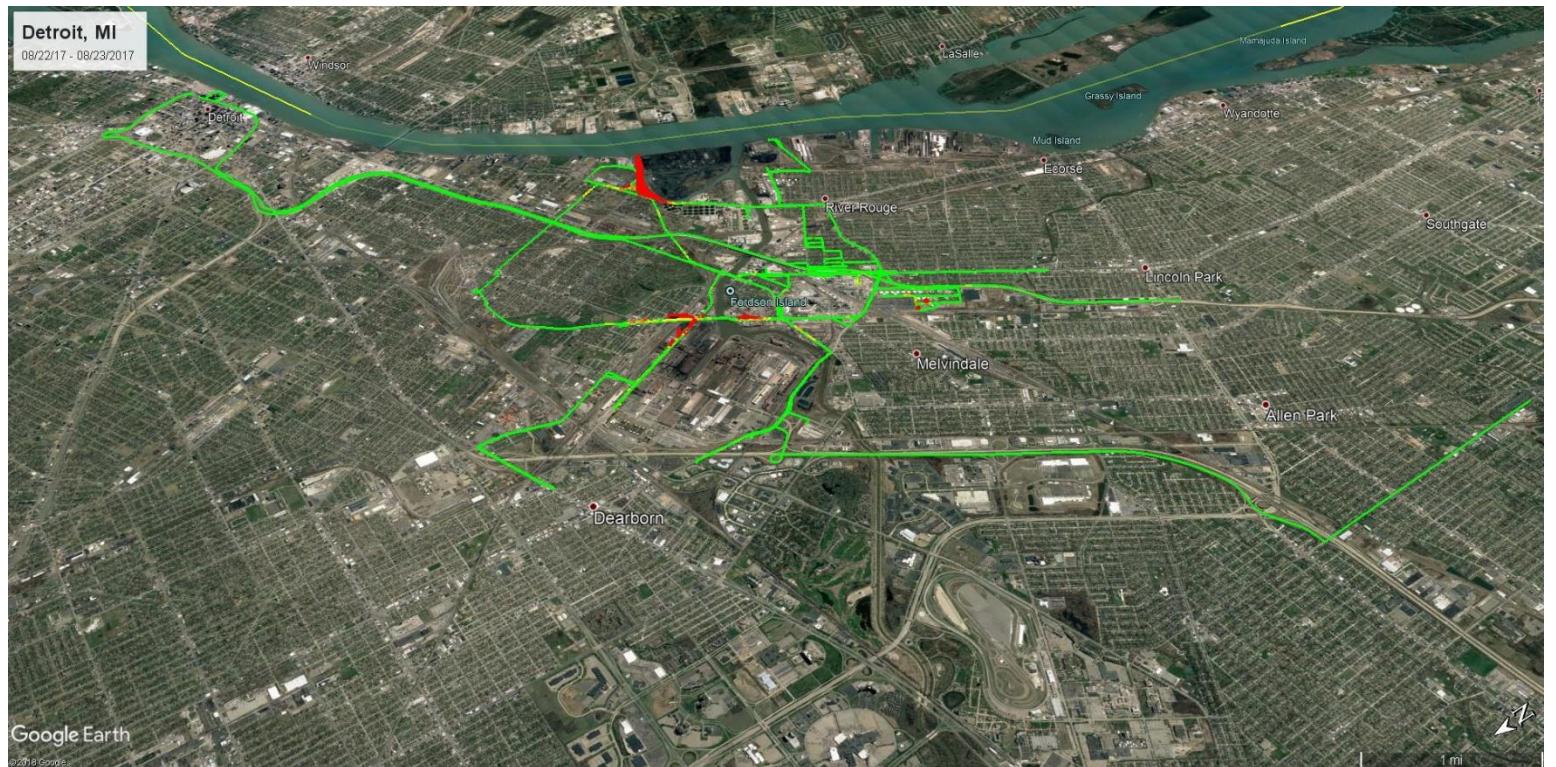


Figure 1: Visual Depiction of Mobile Transects Driven During Campaign 08/22/17 – 08/23/17

## DETROIT, MI GMAP MONITORING



Figure 2: CH4 Mobile Transect Concentration Ribbon with Wind Bars 08/22/17 MA03

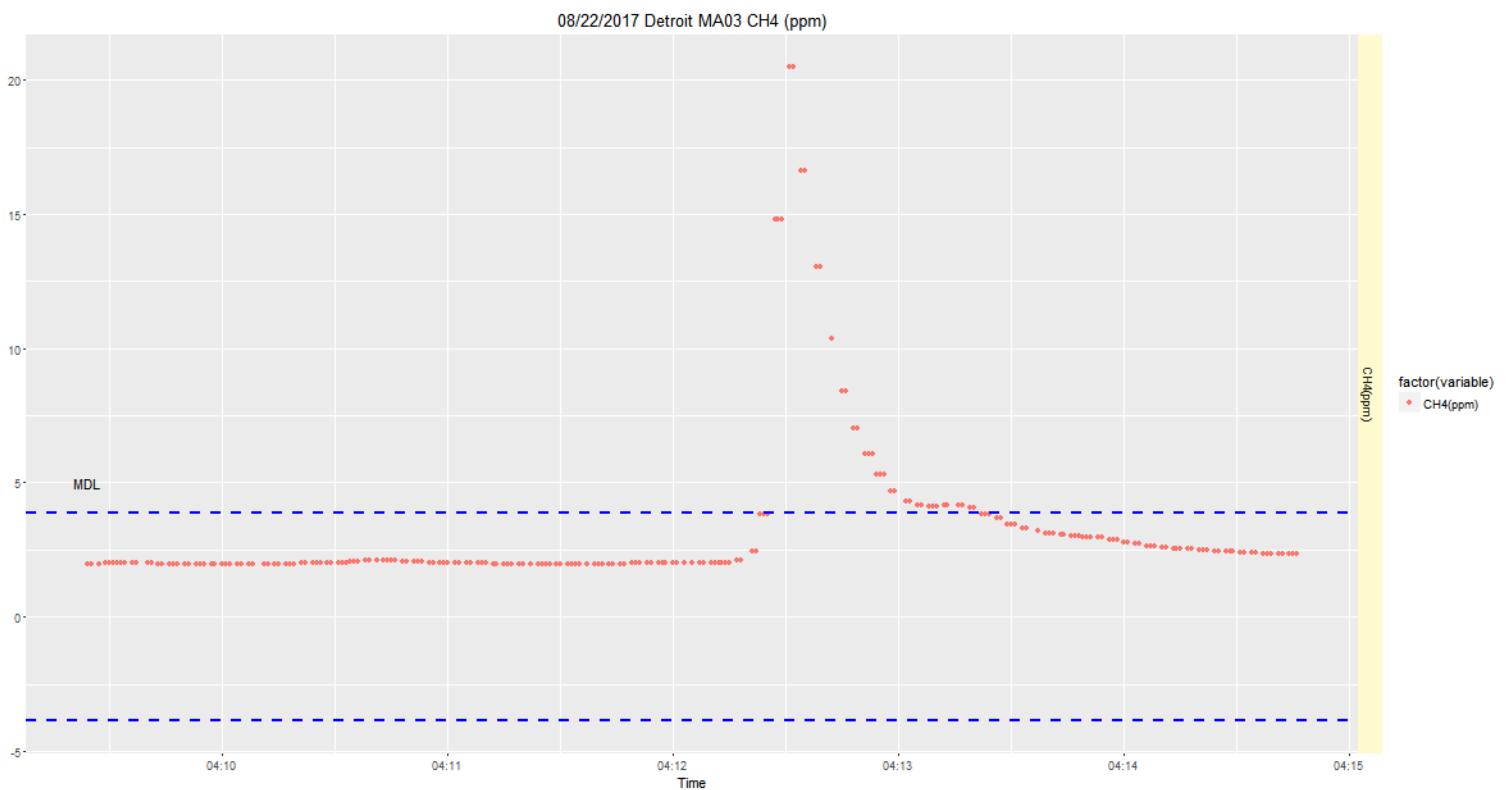
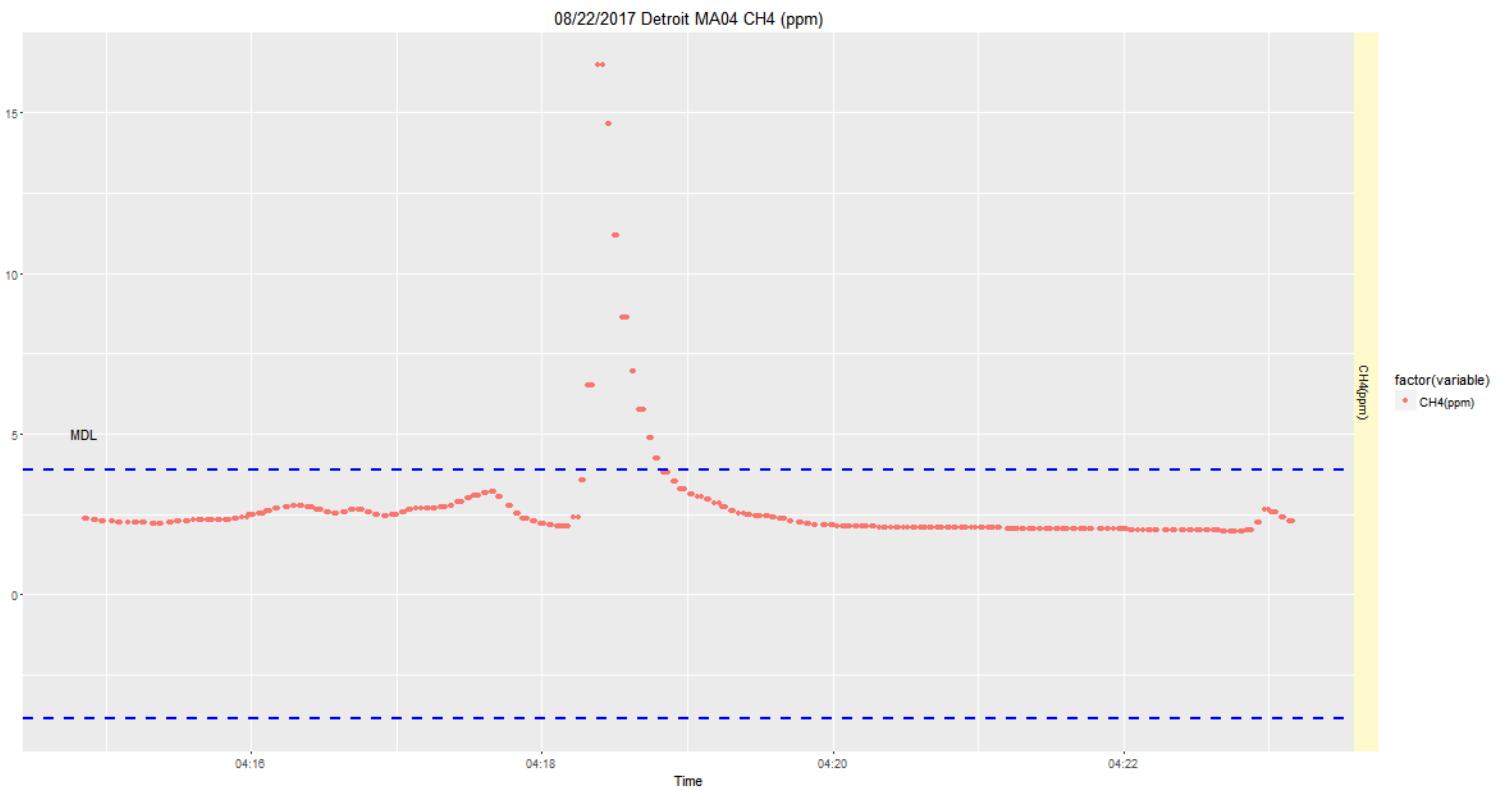


Figure 3: CH4 Time Series 08/22/17 MA03

## DETROIT, MI GMAP MONITORING



Figure 4: CH4 Mobile Transect Concentration Ribbon 08/22/17 MA04



## DETROIT, MI GMAP MONITORING

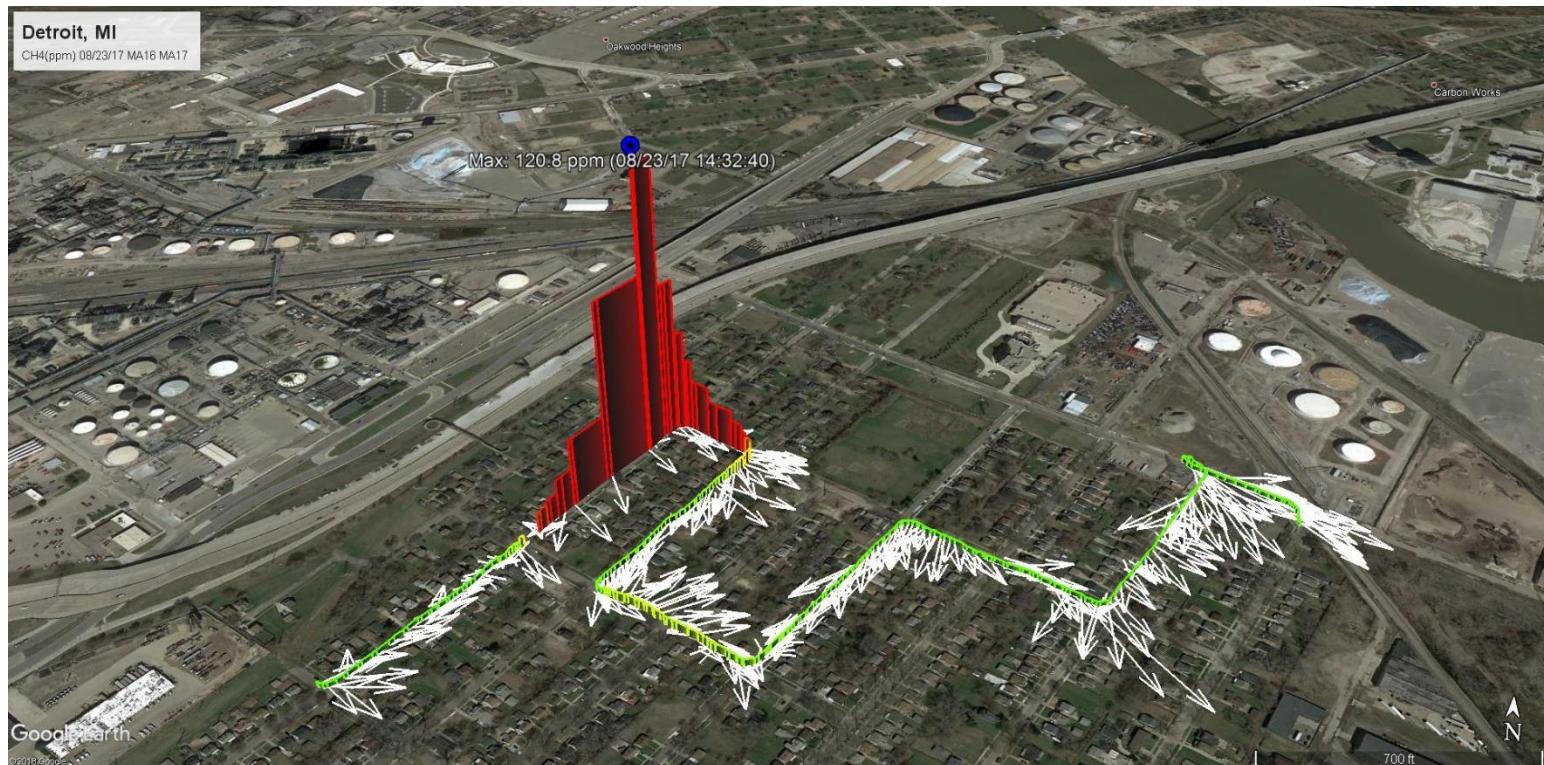


Figure 4: CH4 Mobile Transect Concentration Ribbon with Wind Bars 08/23/17 MA16 MA17

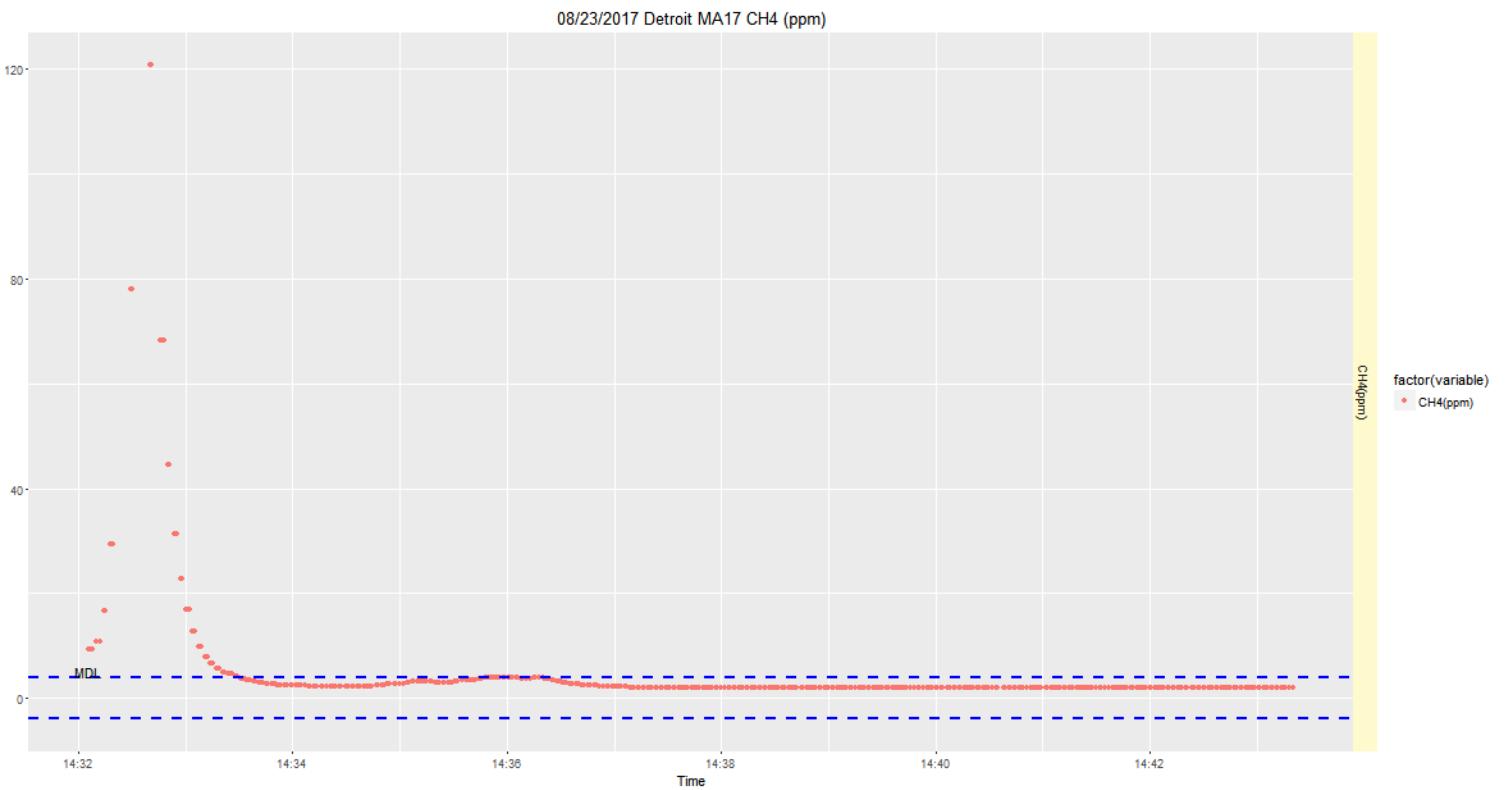


Figure 5: CH4 Time Series 08/23/17 MA17

## DETROIT, MI GMAP MONITORING

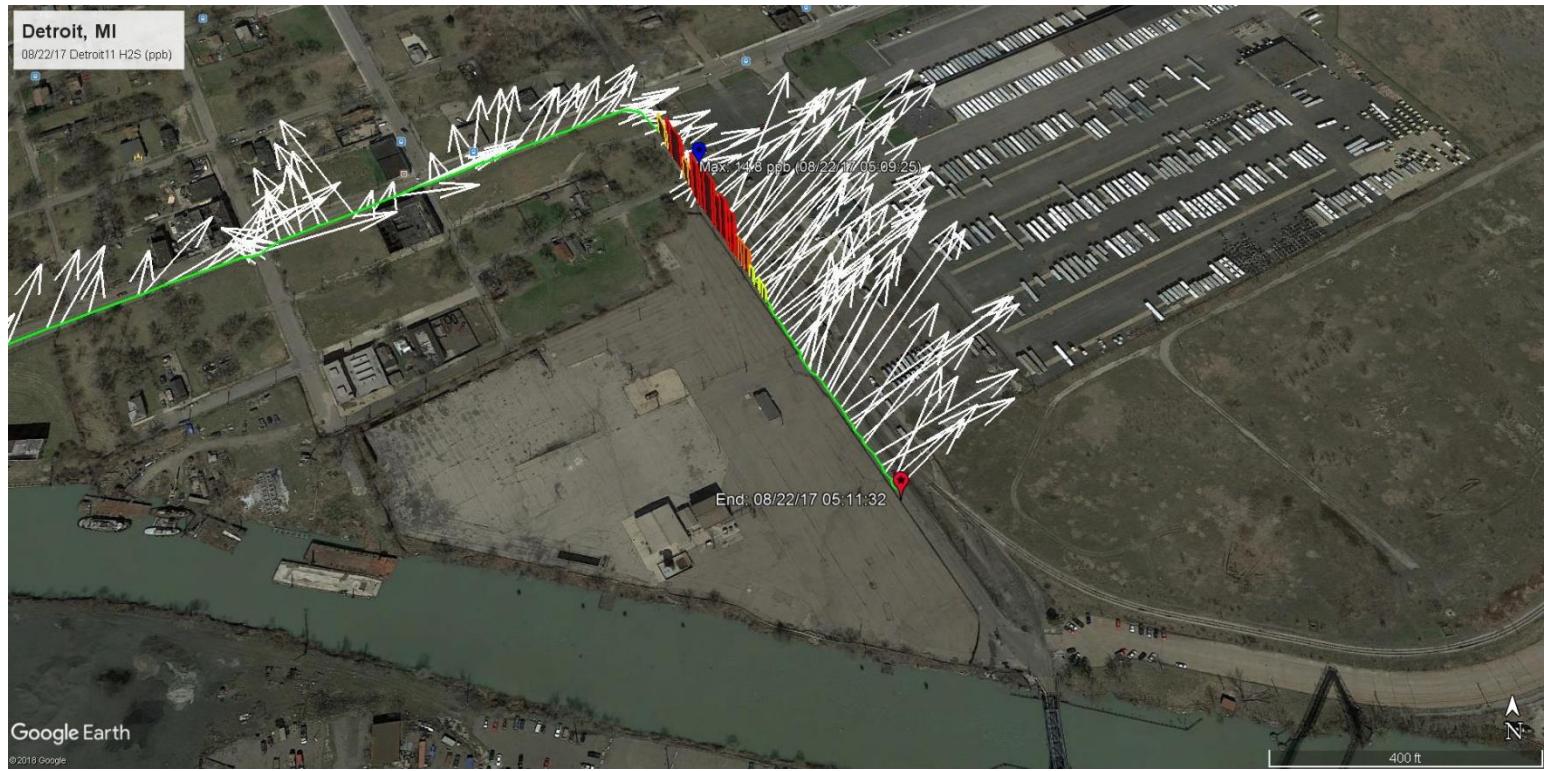


Figure 6: H2S Mobile Transect Concentration Ribbon with Wind Bars 08/22/17 MA11

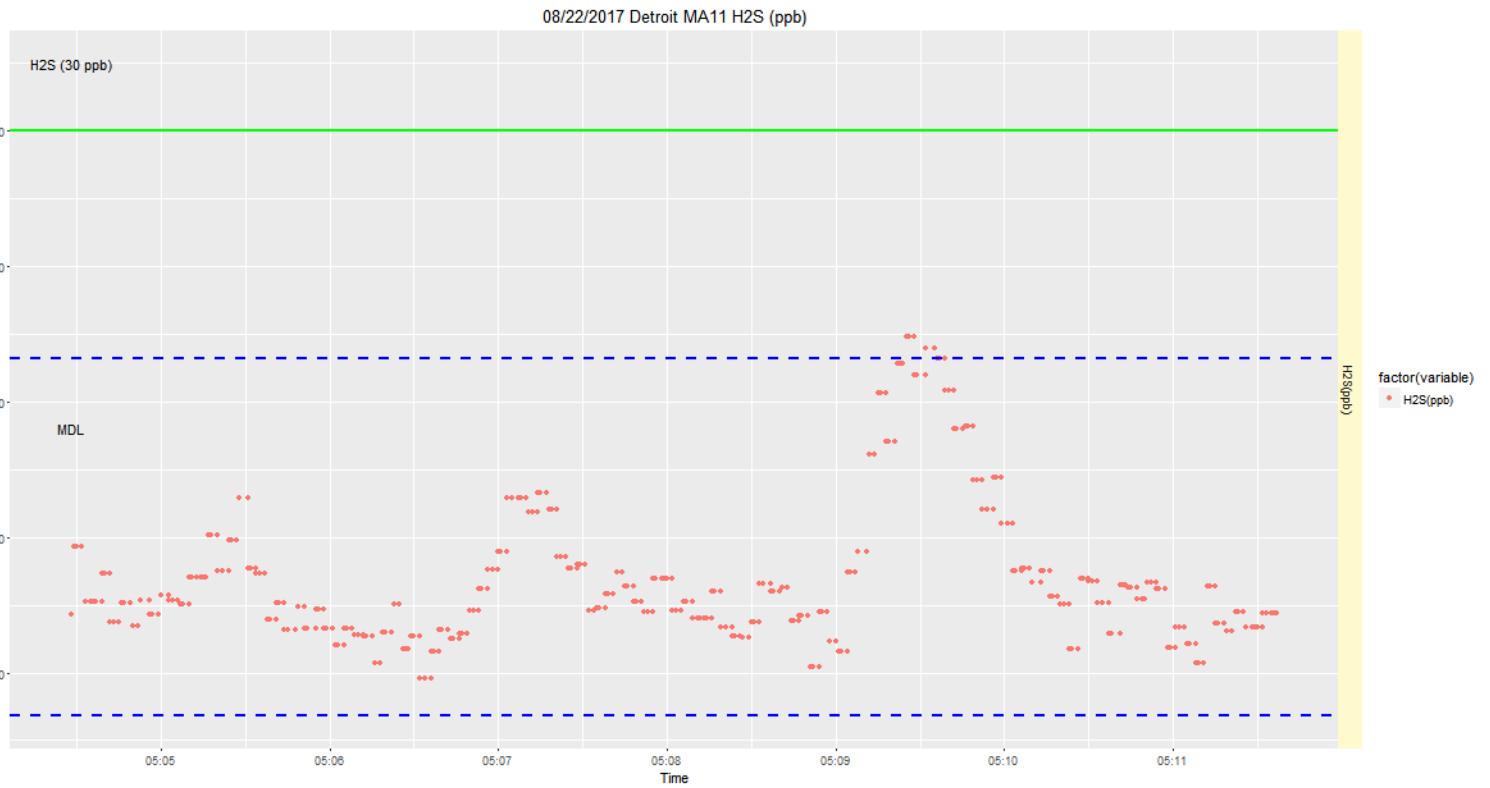


Figure 7: H2S Time Series 08/22/17 MA11

## DETROIT, MI GMAP MONITORING

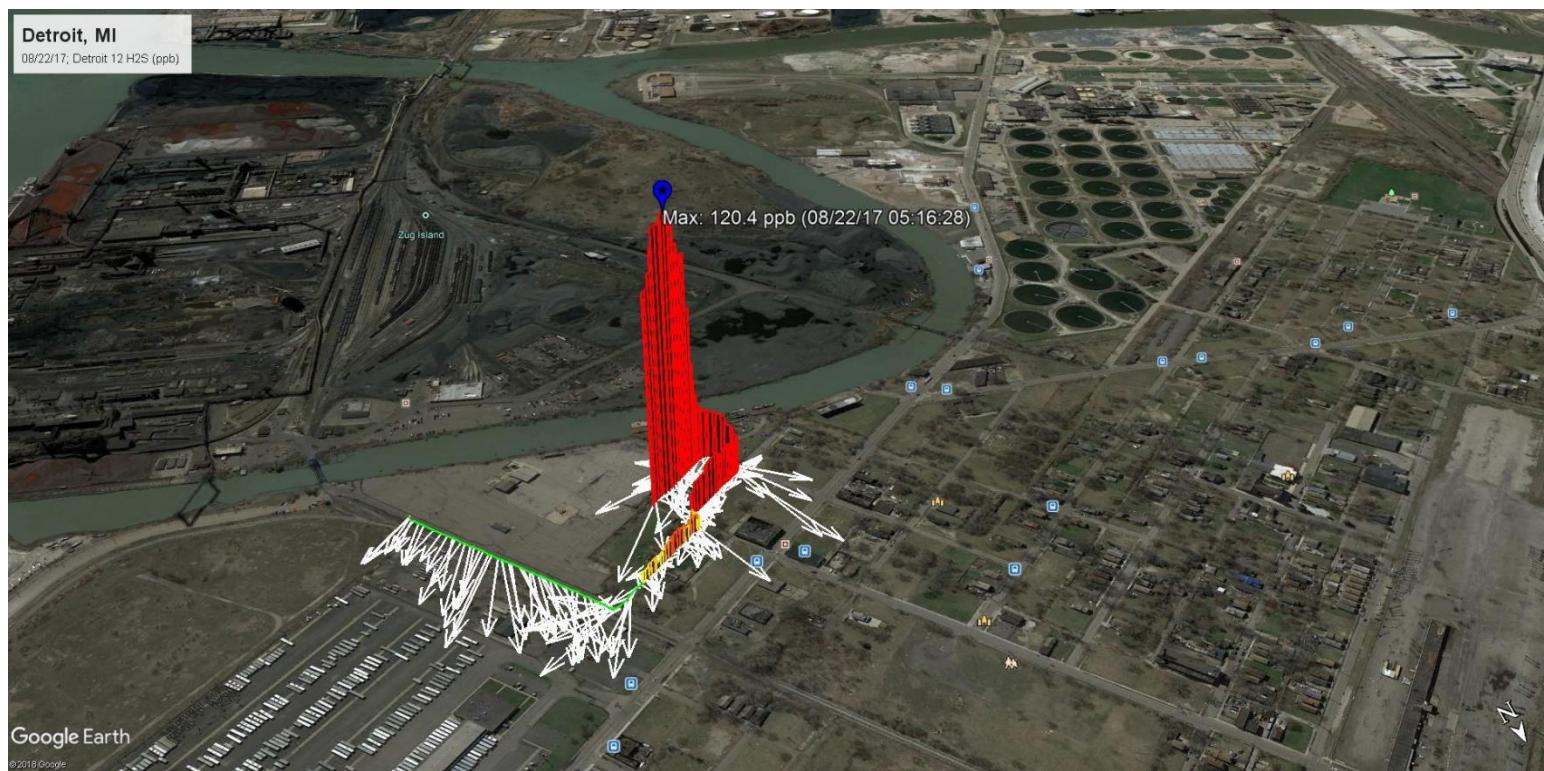


Figure 8: H2S Mobile Transect Concentration Ribbon with Wind Bars 08/22/17 MA12

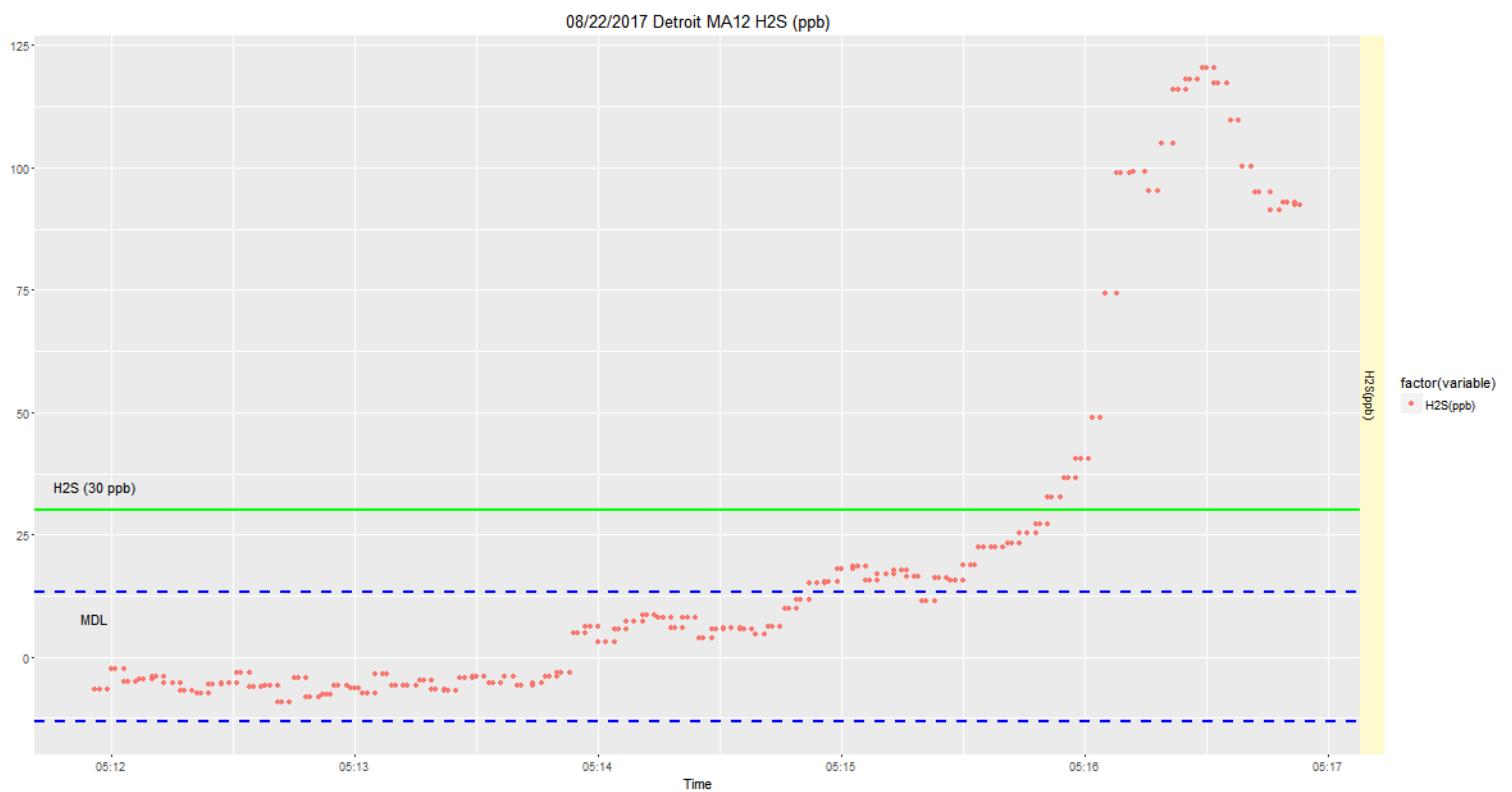


Figure 9: H2S Time Series 08/22/17 MA12

## DETROIT, MI GMAP MONITORING

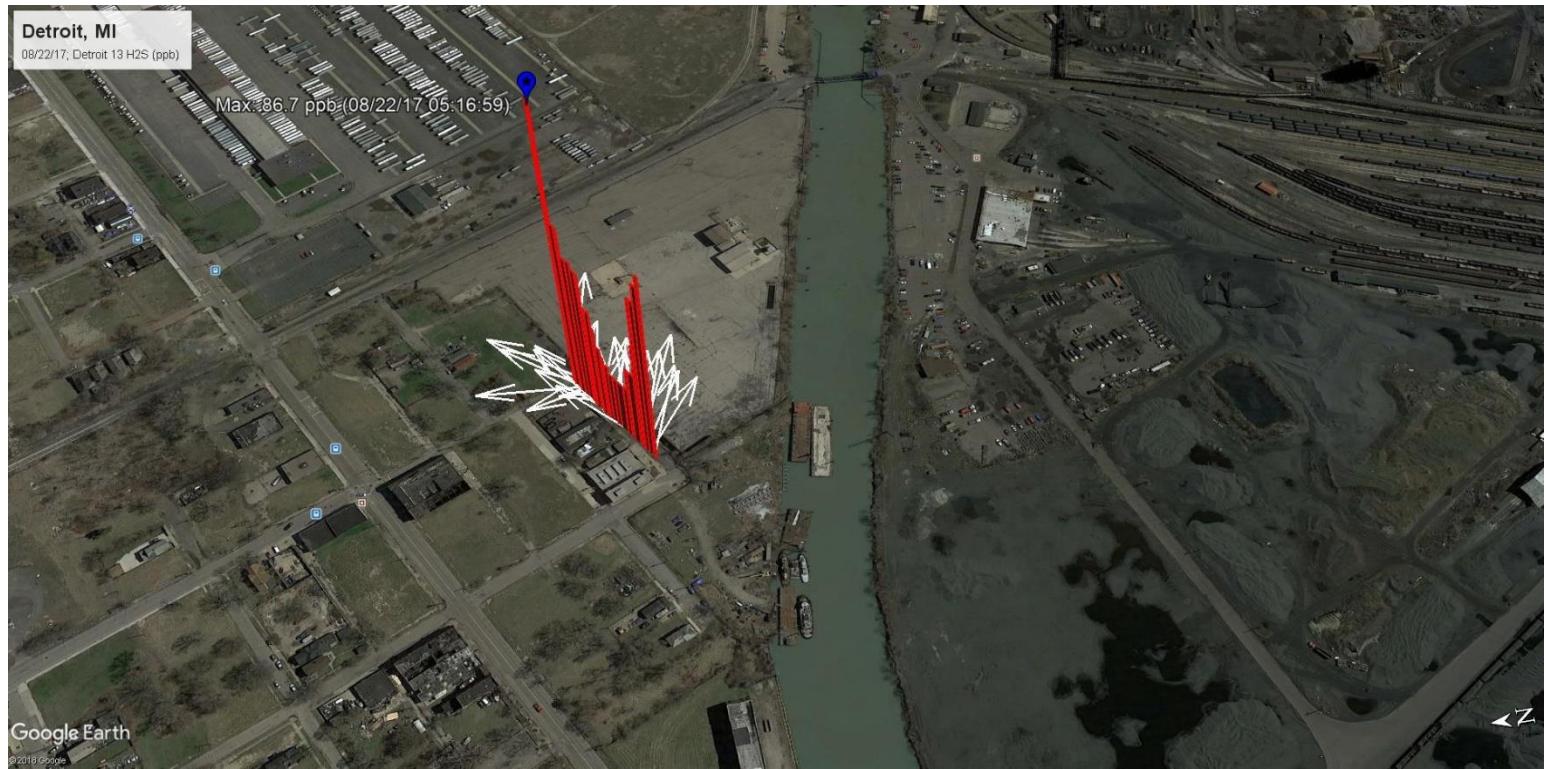


Figure 110: Mobile Transect Concentration Ribbon with Wind Bars 08/22/17 MA13

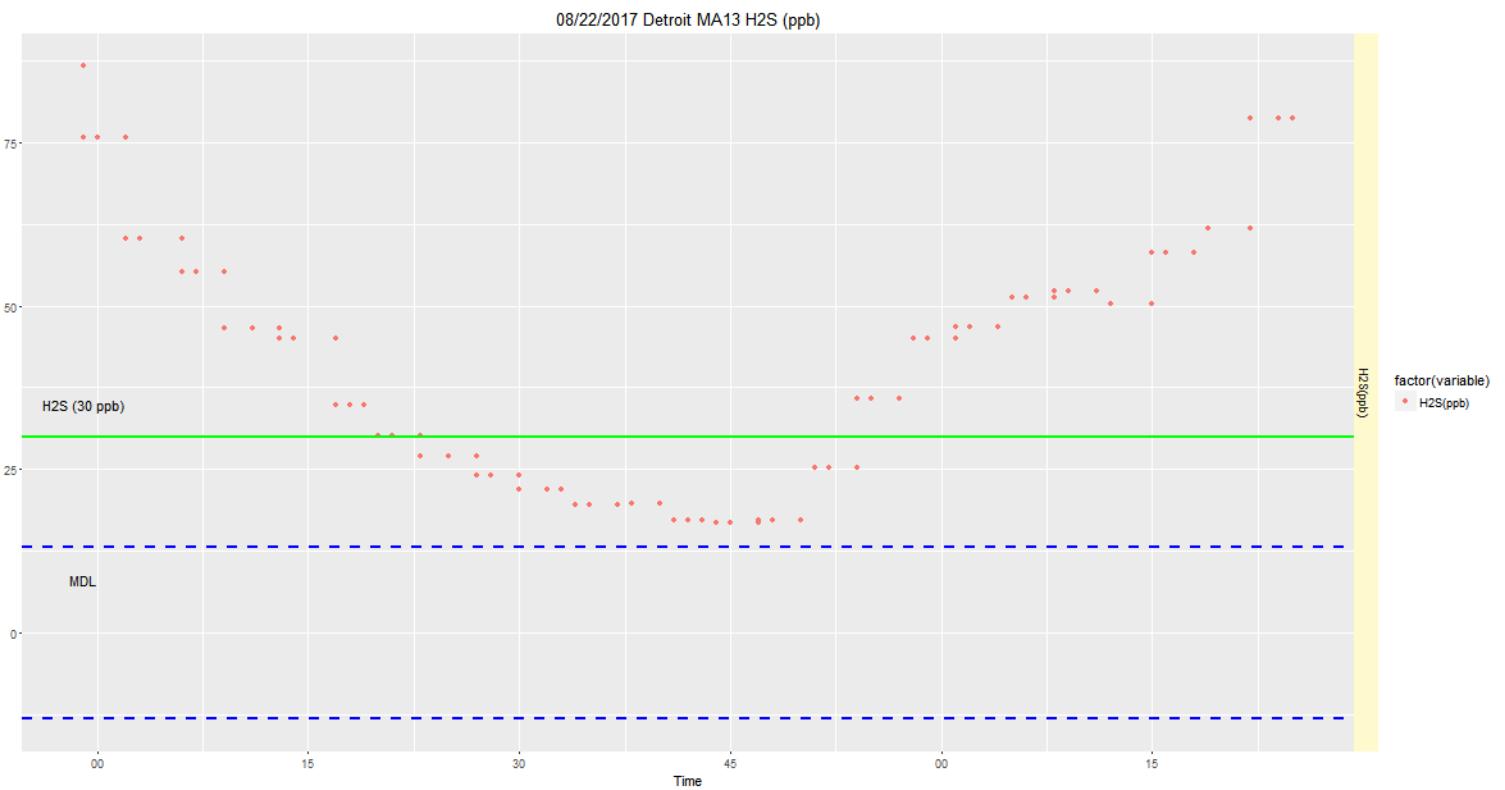


Figure 101: H2S Time Series 08/22/17 MA13

## DETROIT, MI GMAP MONITORING

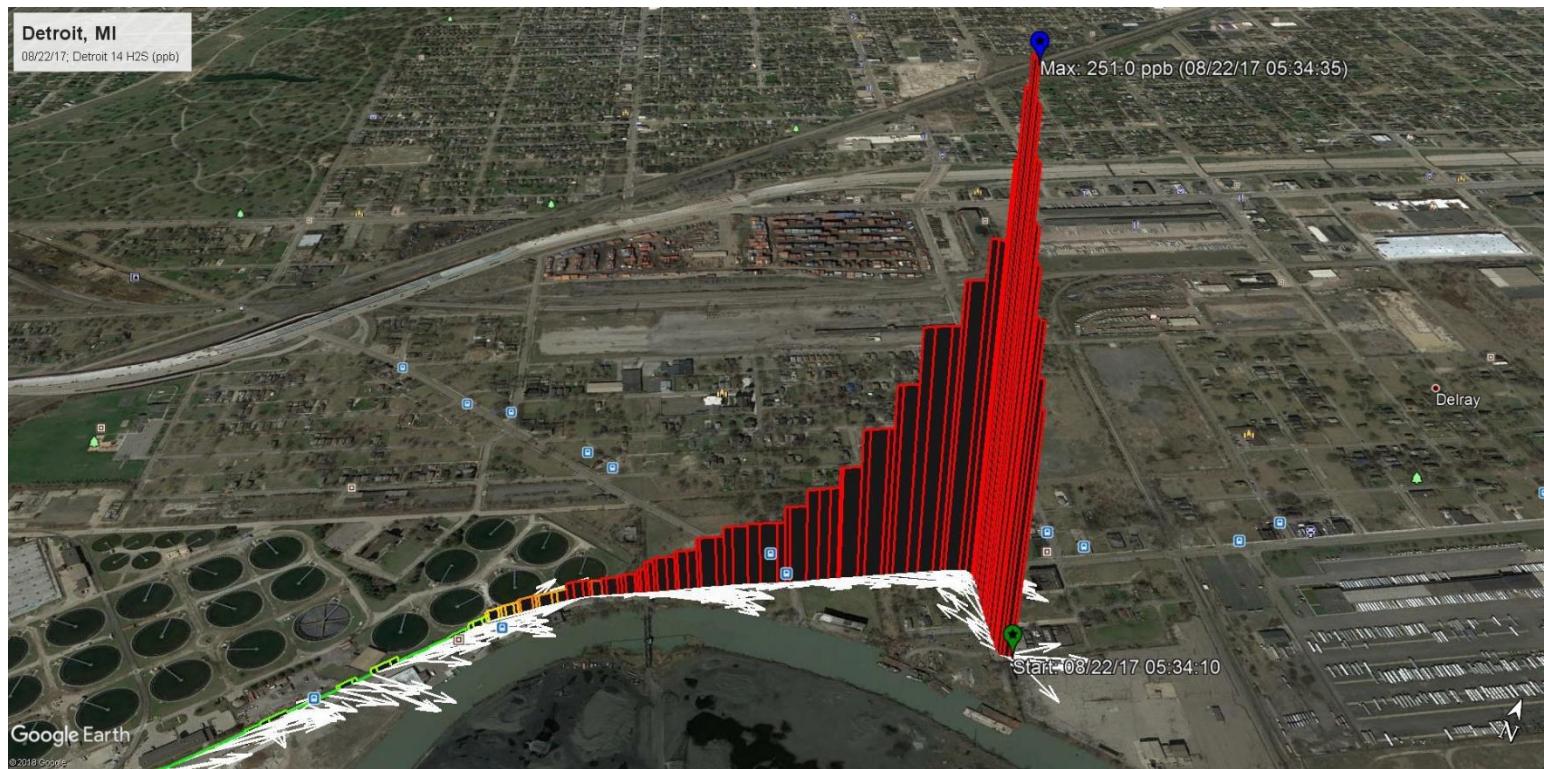


Figure 12: H2S Mobile Concentration Ribbon with Wind Bars 08/22/17 MA14

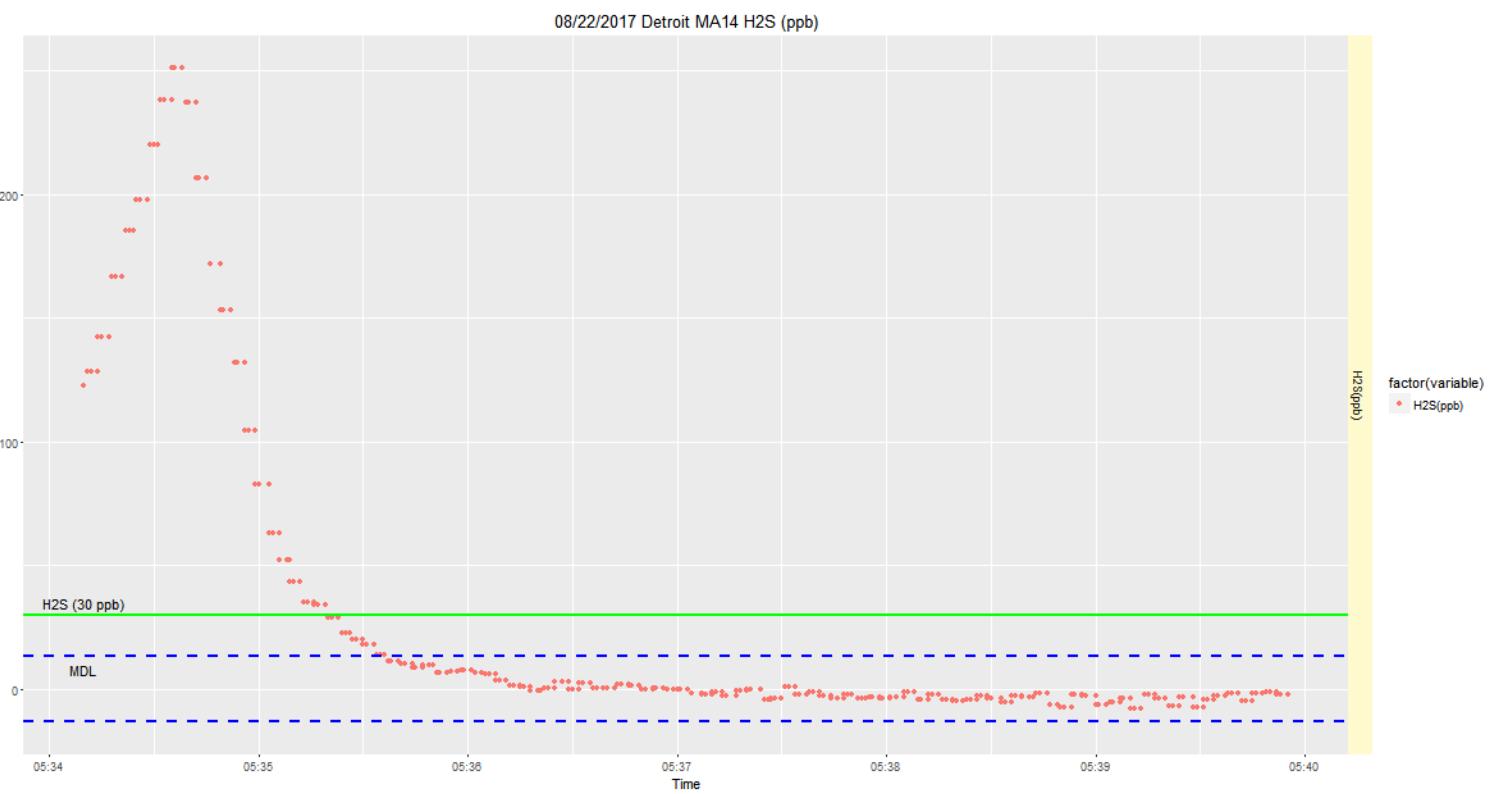


Figure 13: H2S Time Series 08/22/17 MA14

## DETROIT, MI GMAP MONITORING

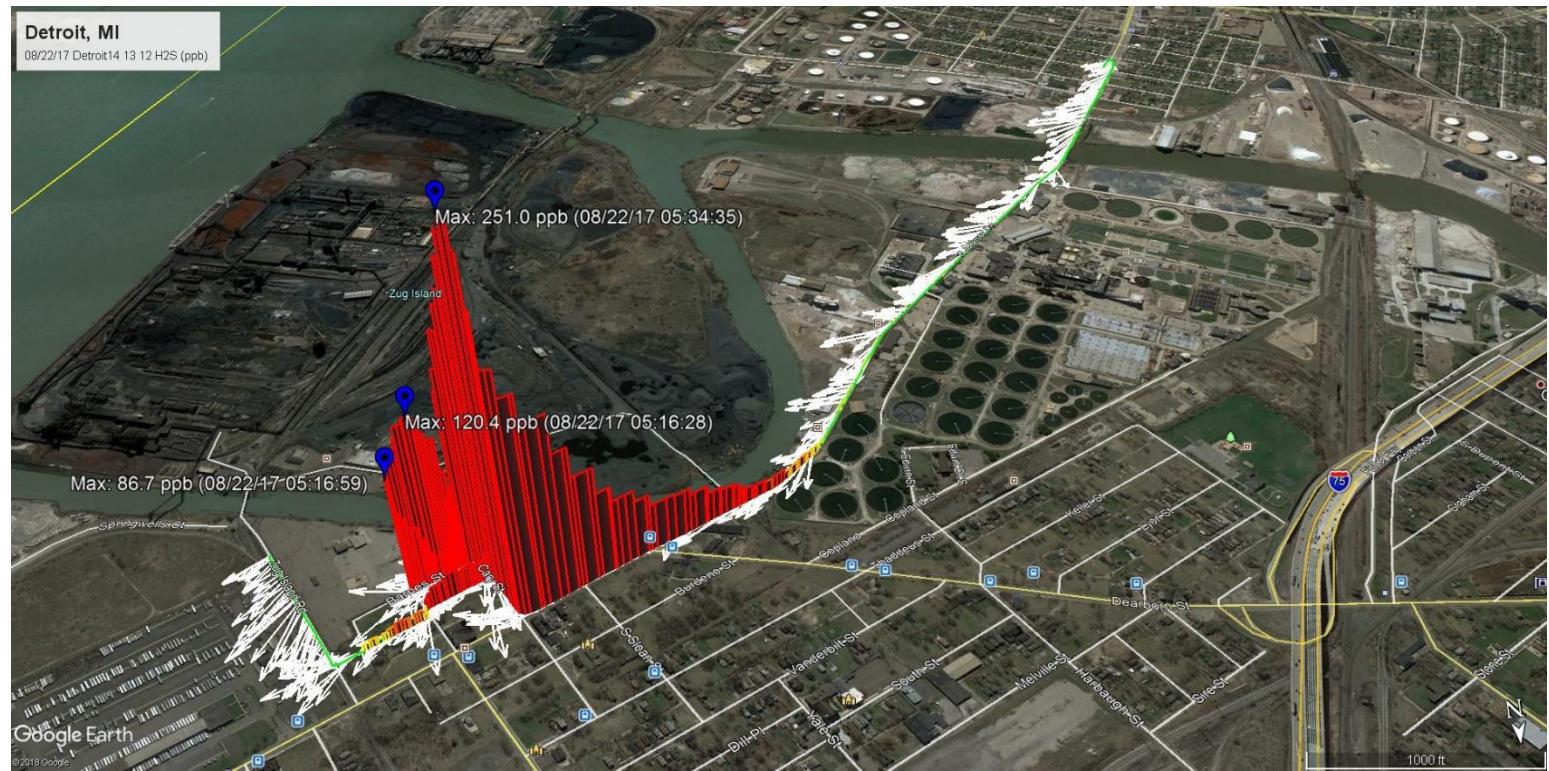


Figure 14: H2S Merged Mobile Concentration Ribbons with Wind Bars 08/22/17 MA12 MA13 MA14

## DETROIT, MI GMAP MONITORING

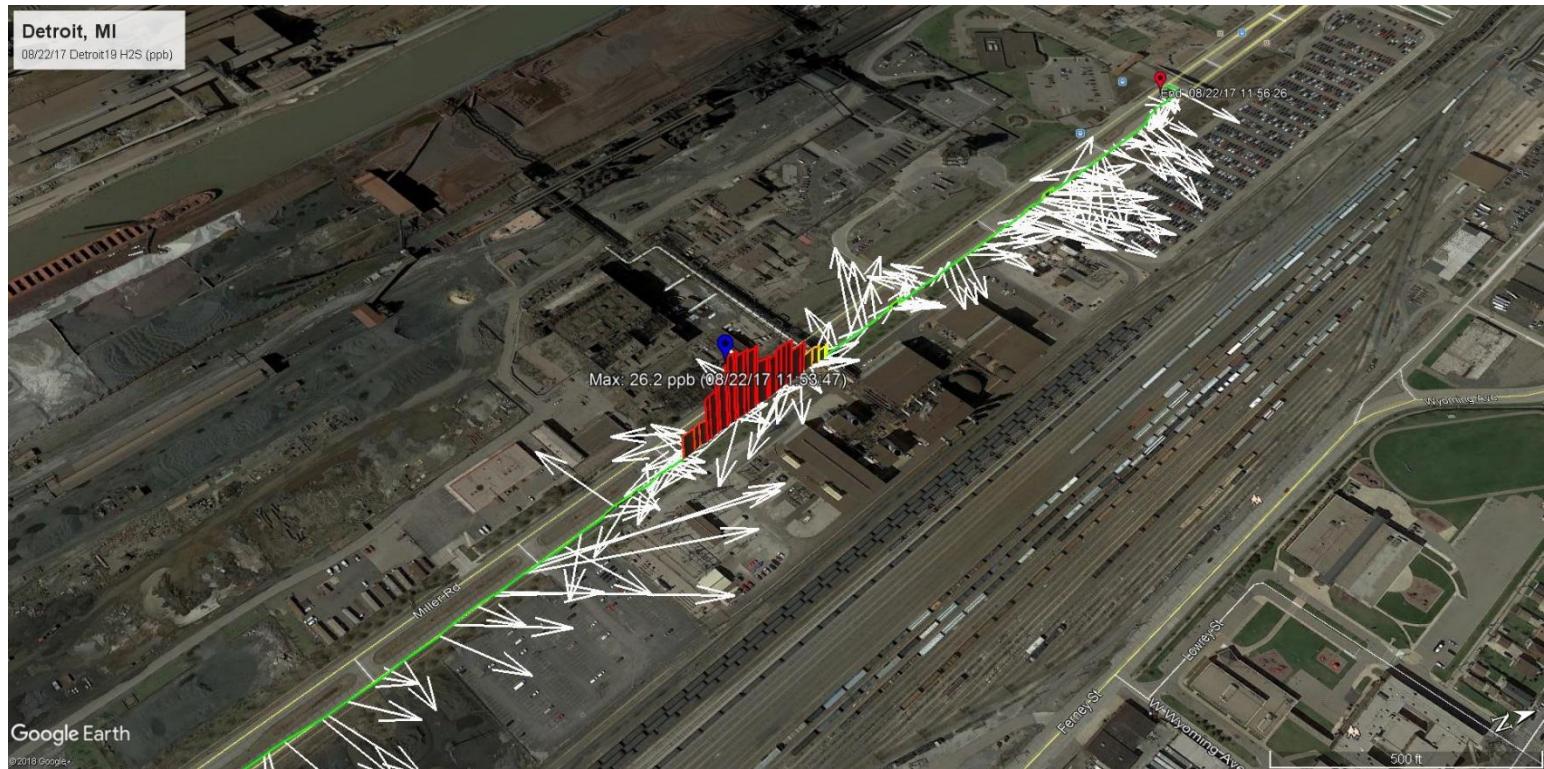


Figure 15: H2S Mobile Concentration Ribbon with Wind Bars 08/22/17 MA19

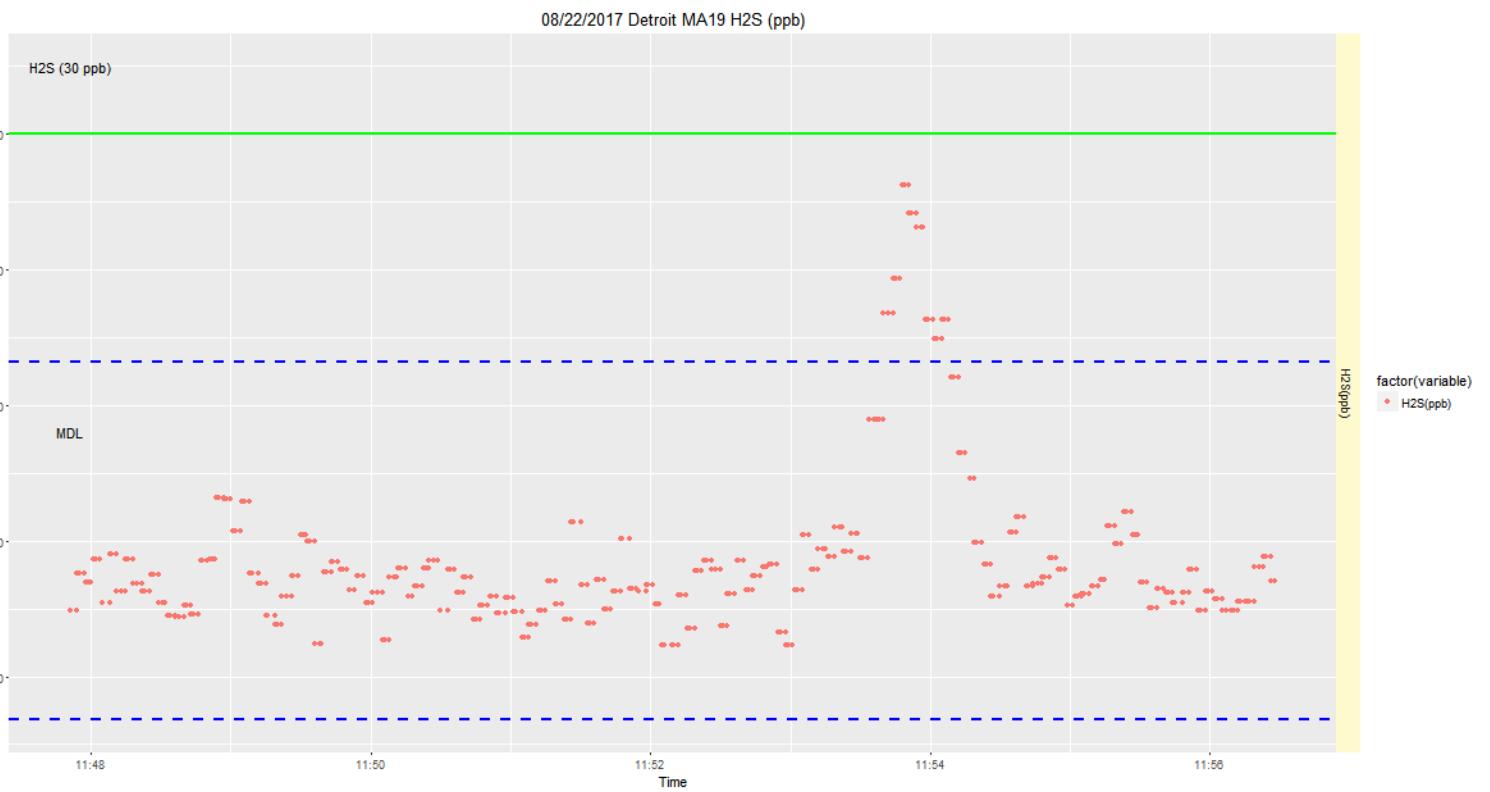


Figure 16: H2S Time Series 08/22/17 MA19

## DETROIT, MI GMAP MONITORING

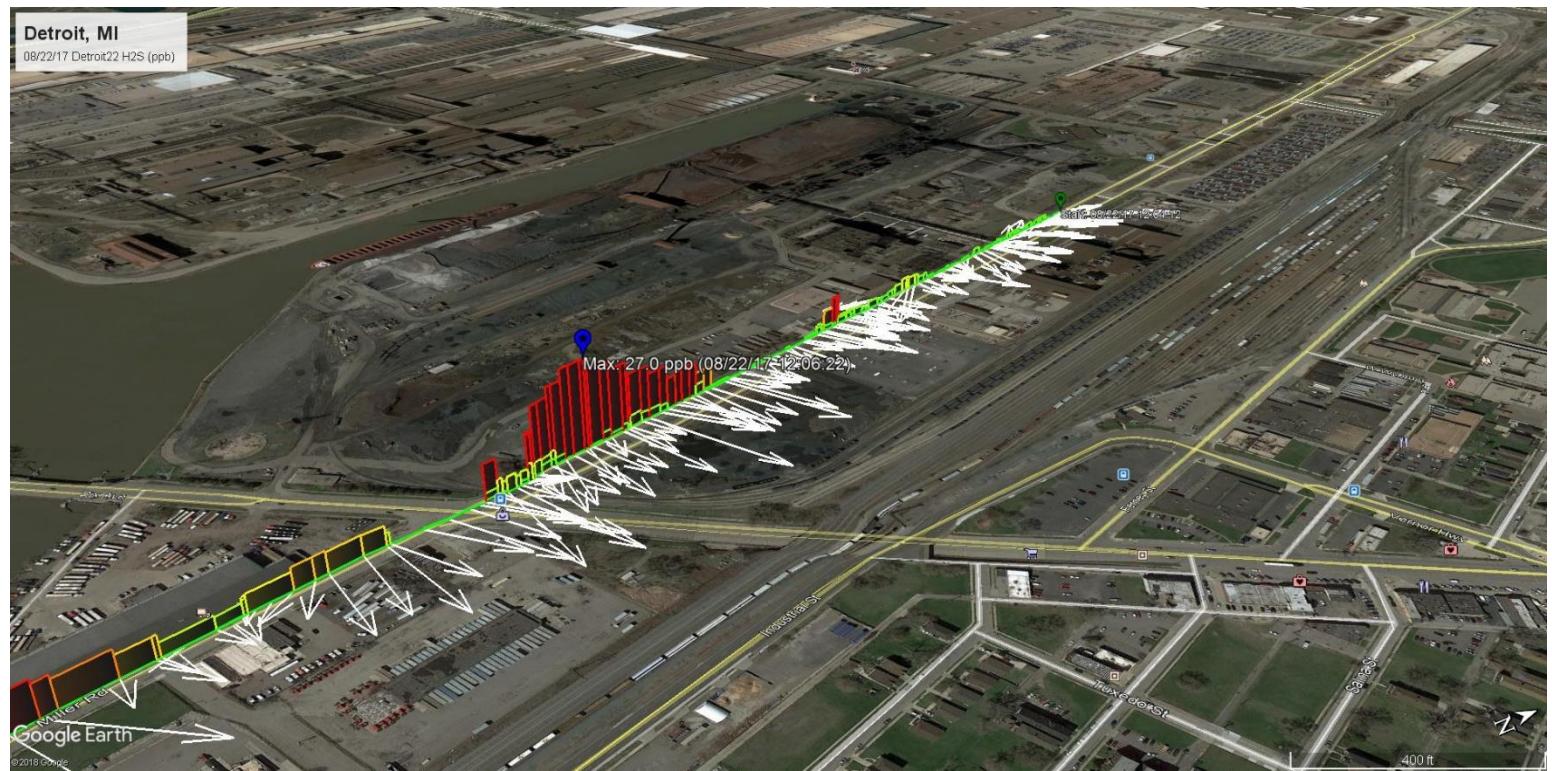


Figure 17: H2S Mobile Concentration Ribbon with Wind Bars 08/22/17 MA22

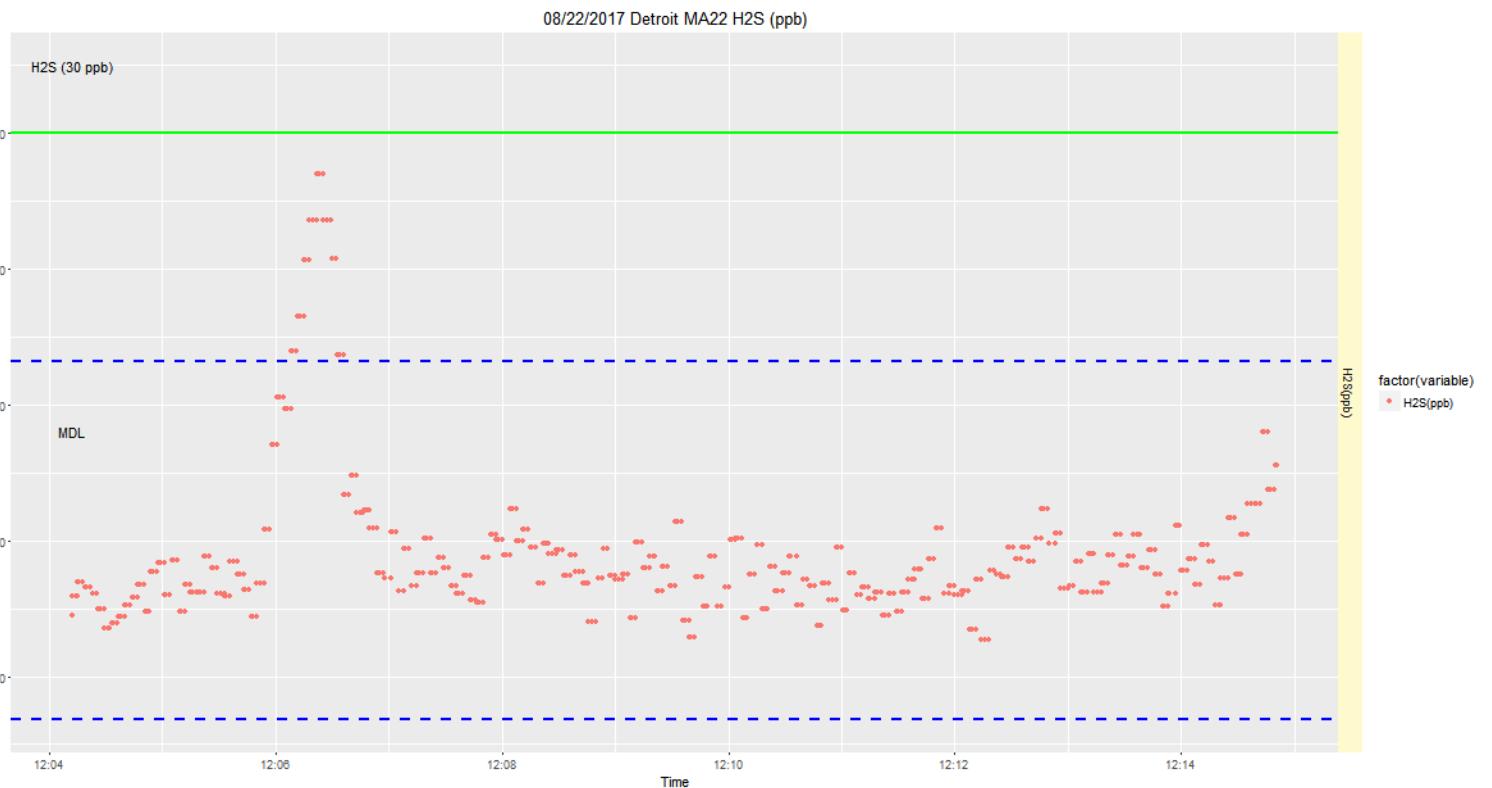


Figure 18: H2S Time Series 08/22/17 MA22

### DETROIT, MI GMAP MONITORING

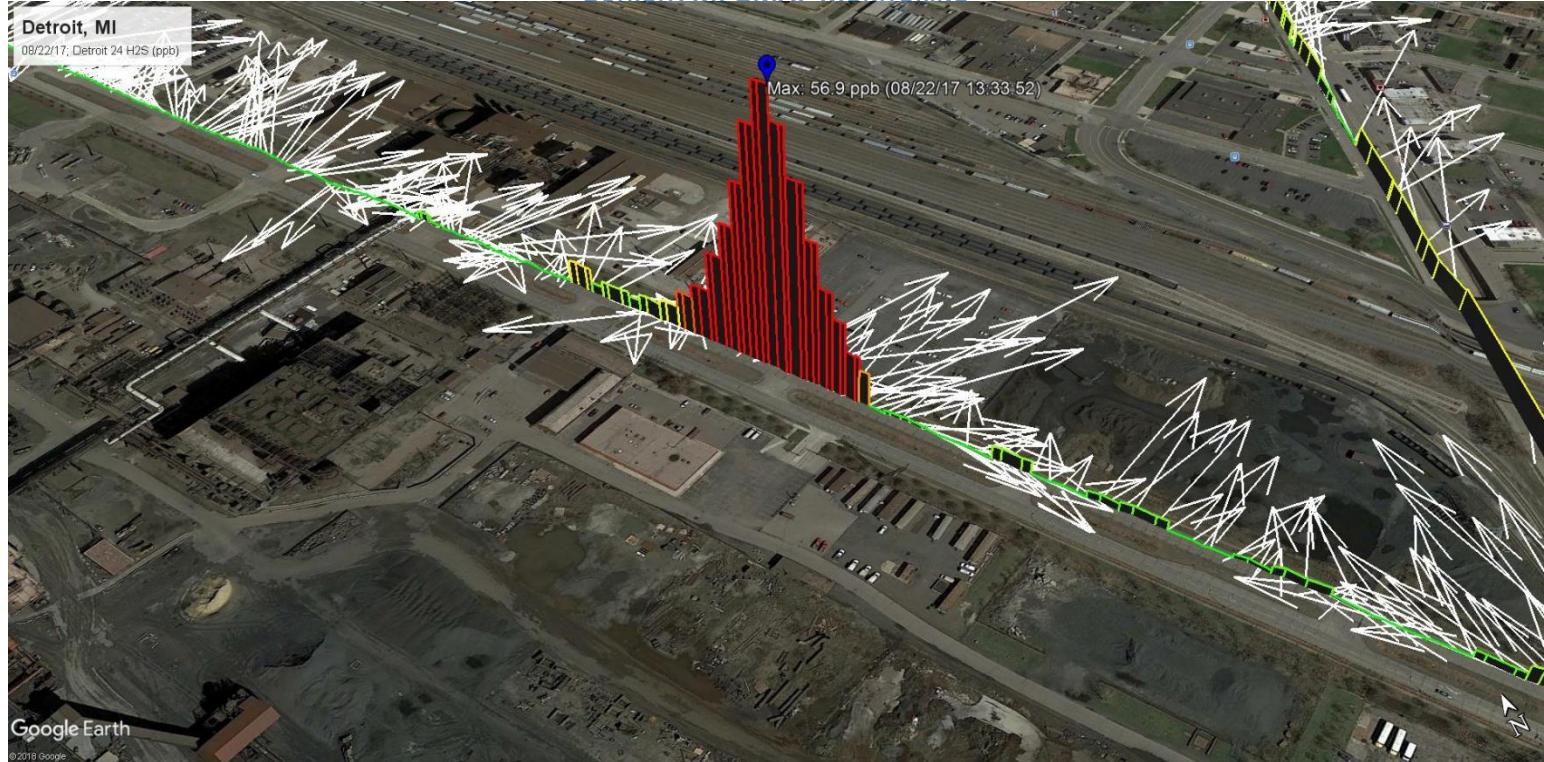


Figure 19: H2S Mobile Concentration Ribbon with Wind Bars 08/22/17 MA24

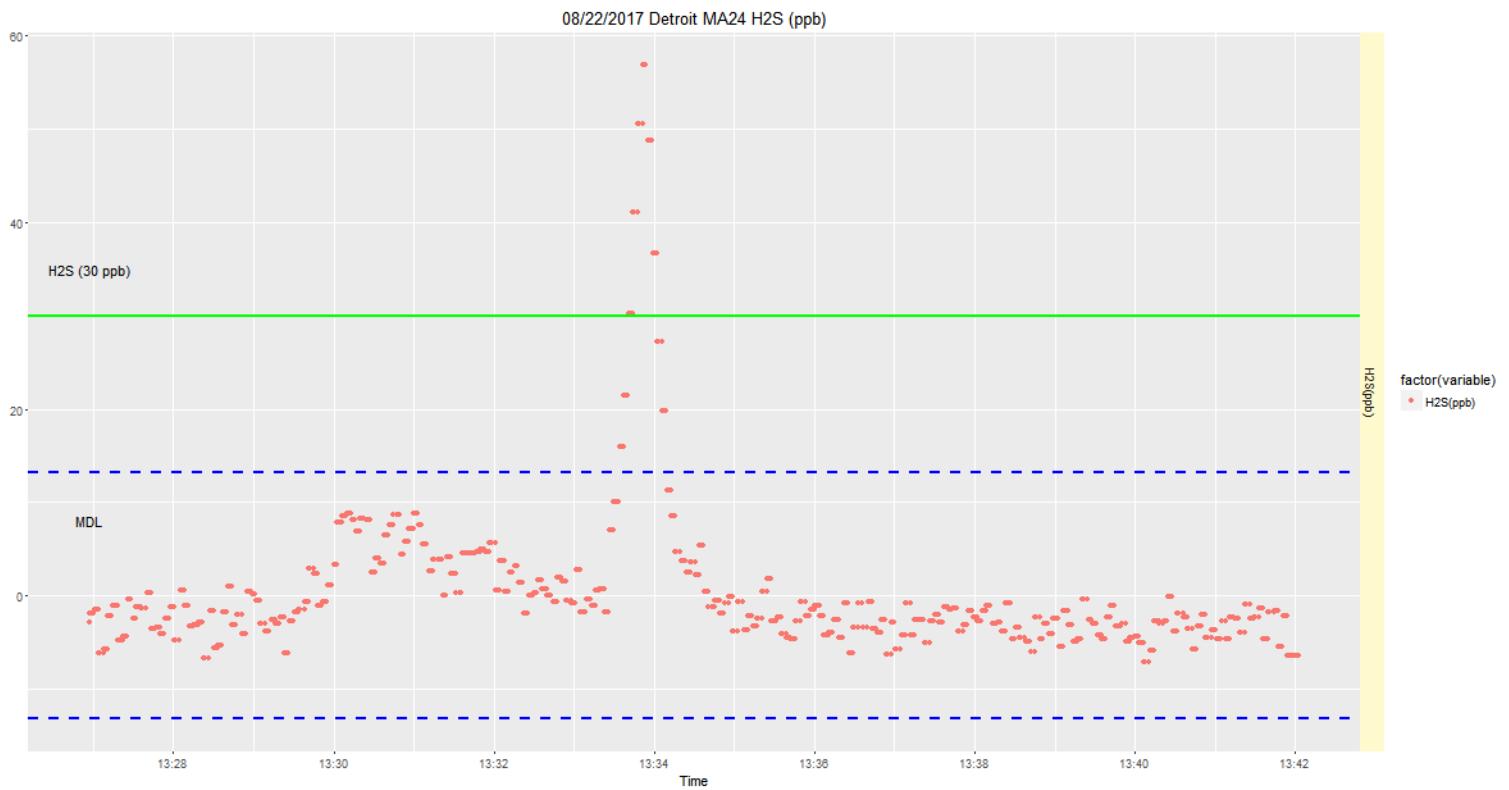


Figure 20: H2S Time Series 08/22/17 MA24

## DETROIT, MI GMAP MONITORING

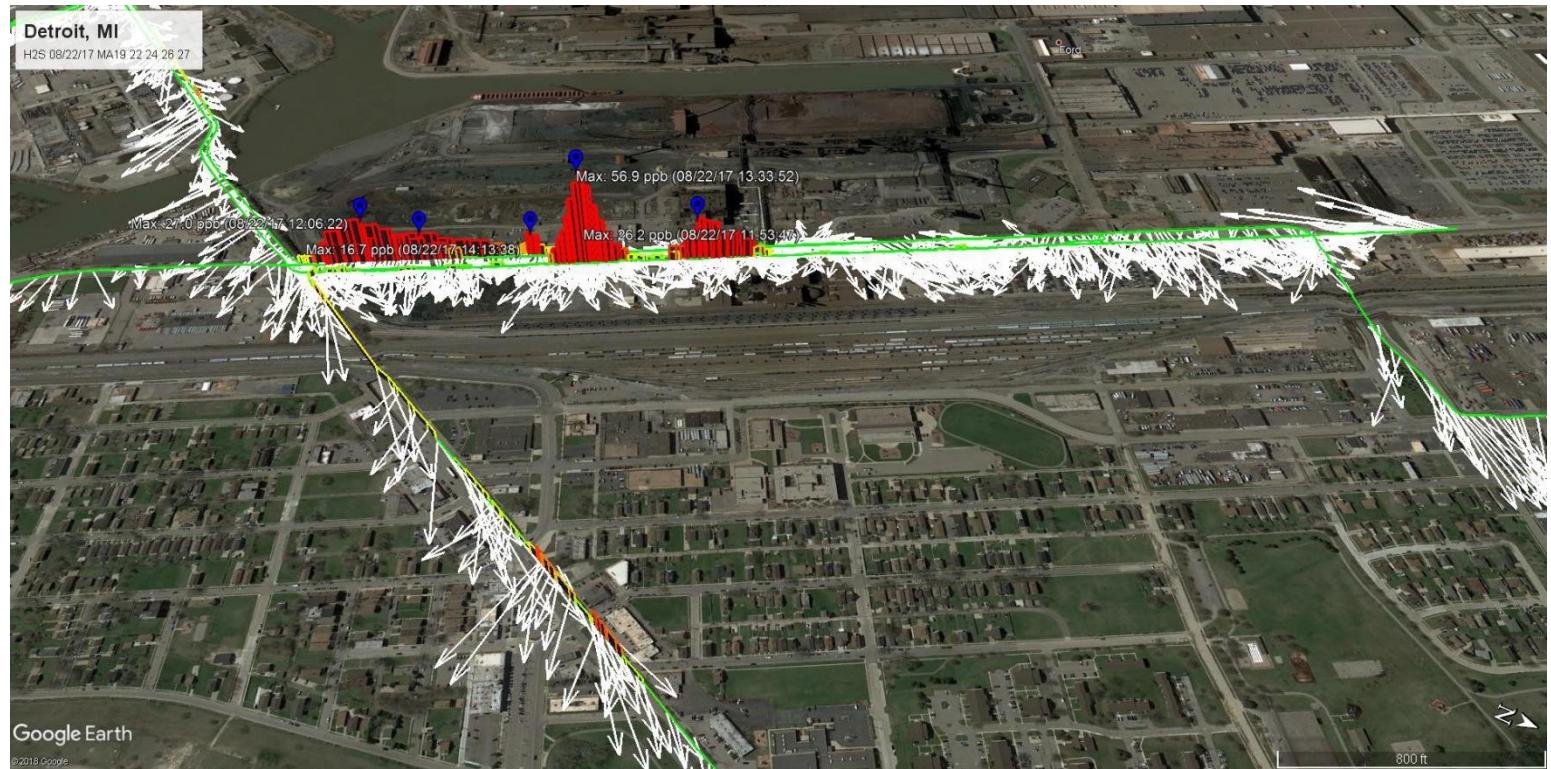


Figure 21: H2S Mobile Concentration Ribbon with Wind Bars 08/22/17 MA 19 MA22 MA24 MA26 MA27

## DETROIT, MI GMAP MONITORING

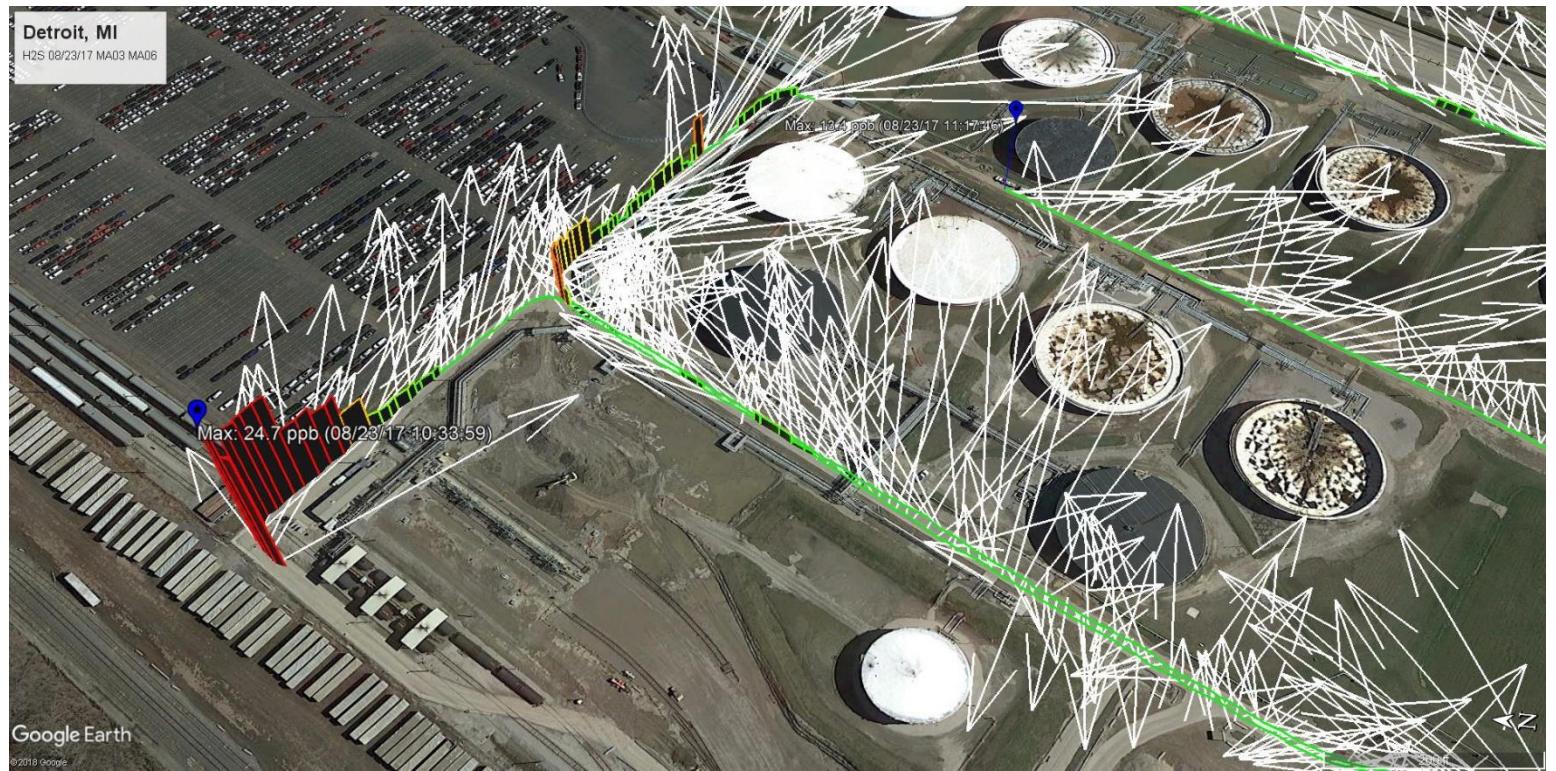


Figure 232: H2S Mobile Concentration Ribbon 08/23/17 MA03 MA06

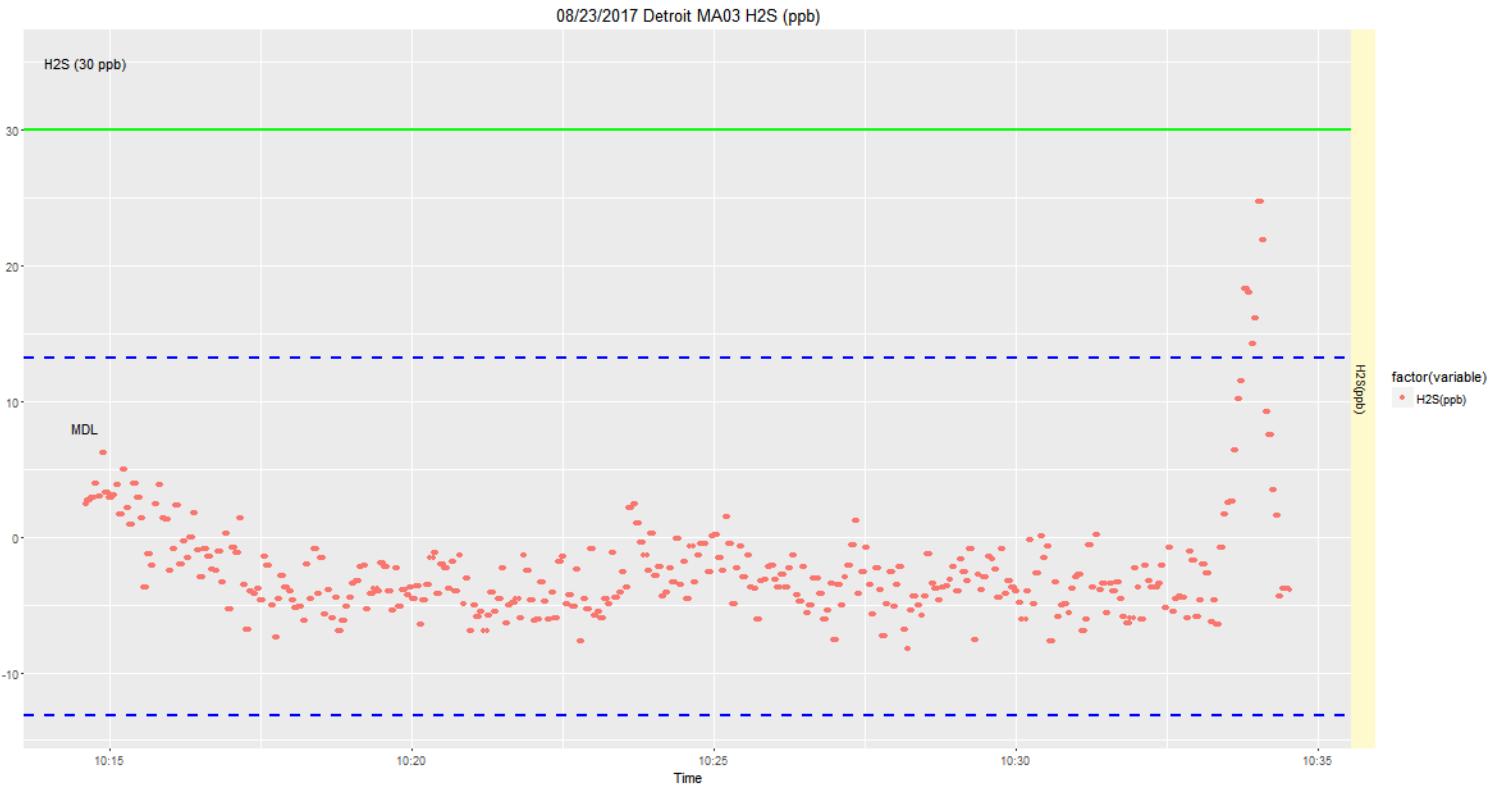


Figure 223: H2S Time Series 08/23/17 MA03

## DETROIT, MI GMAP MONITORING

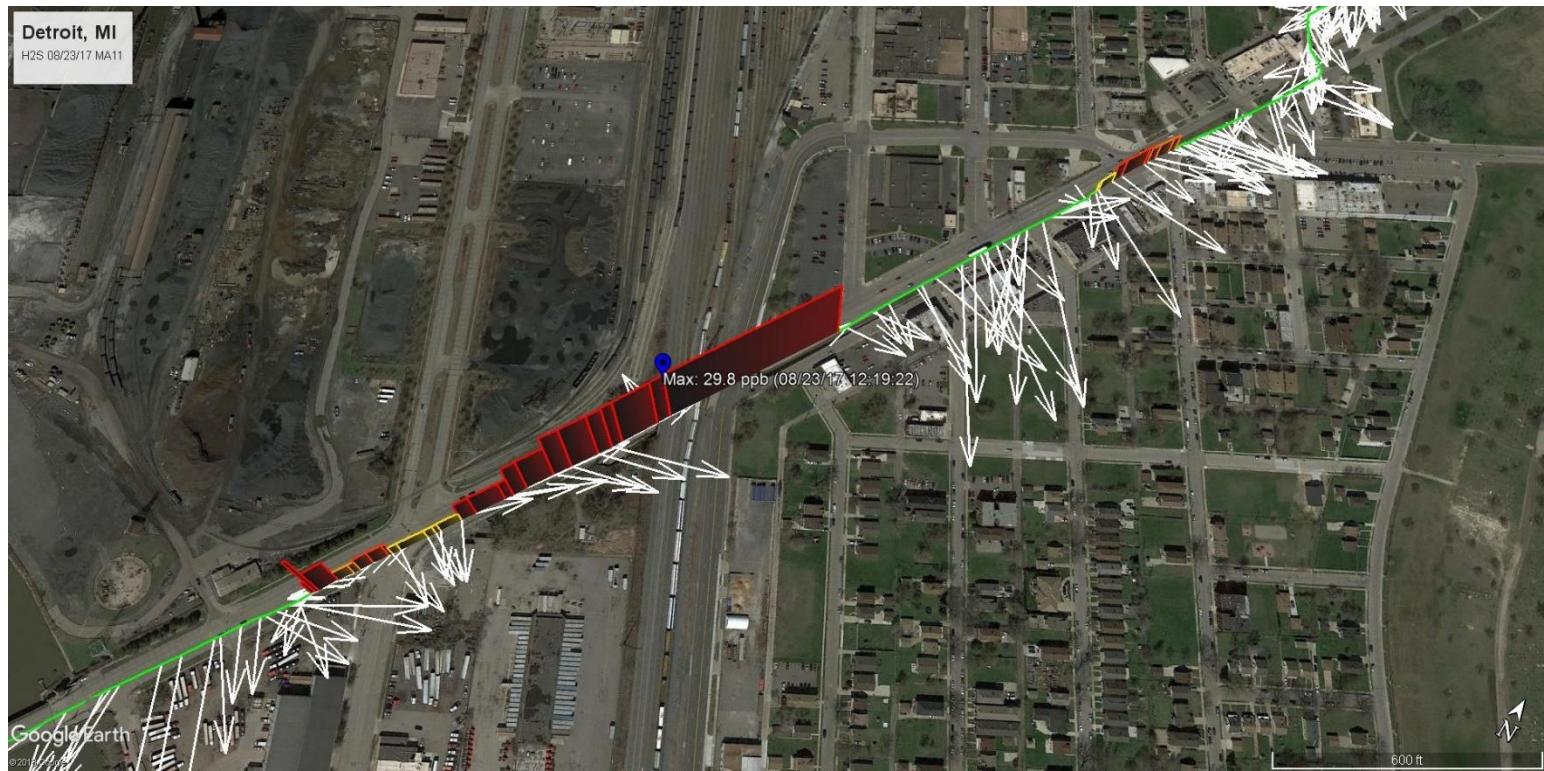


Figure 244: H2S Mobile Concentration Ribbon 08/23/17 MA11

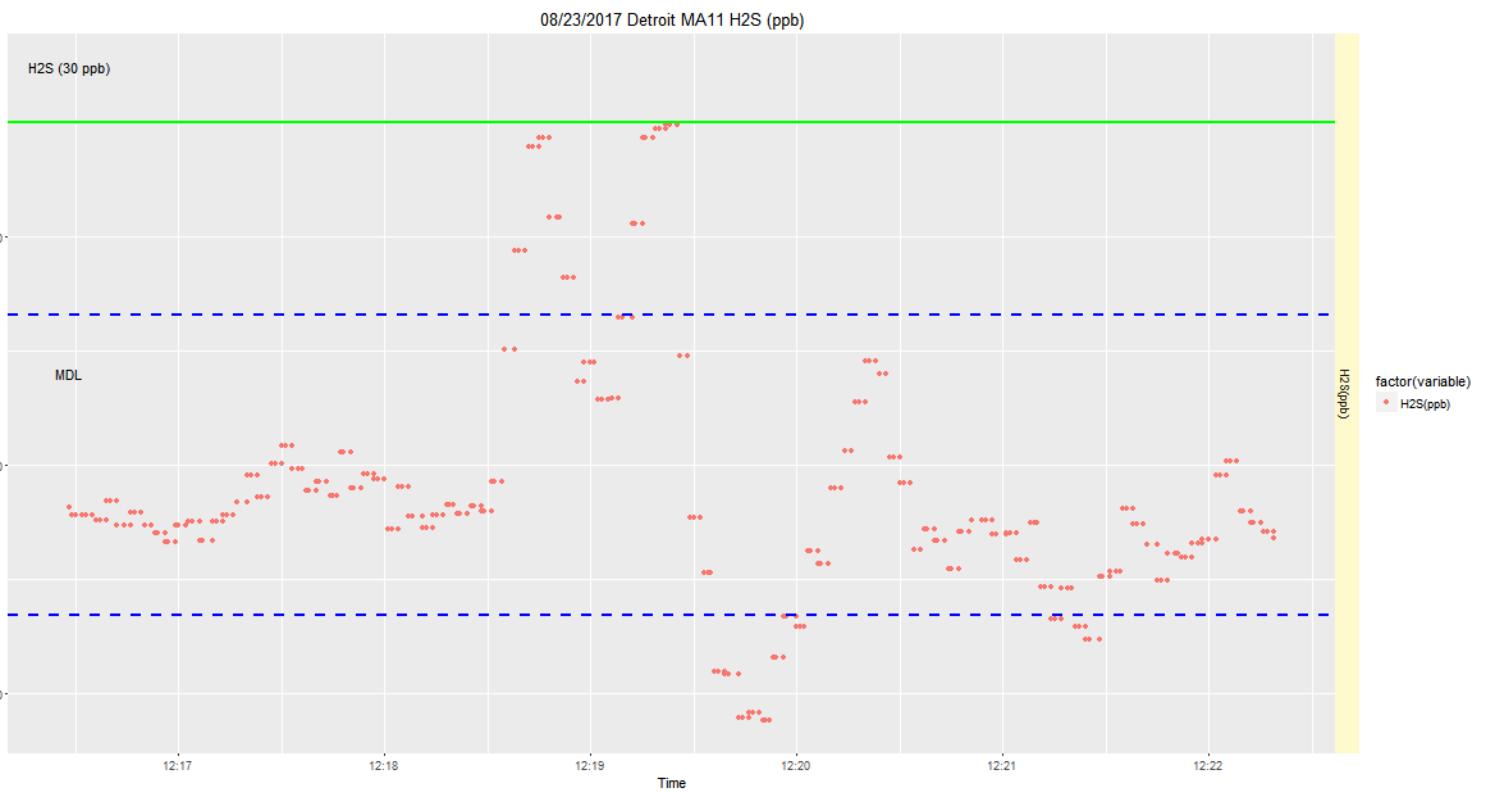


Figure 25: H2S Time Series 08/23/17 MA11

## DETROIT, MI GMAP MONITORING

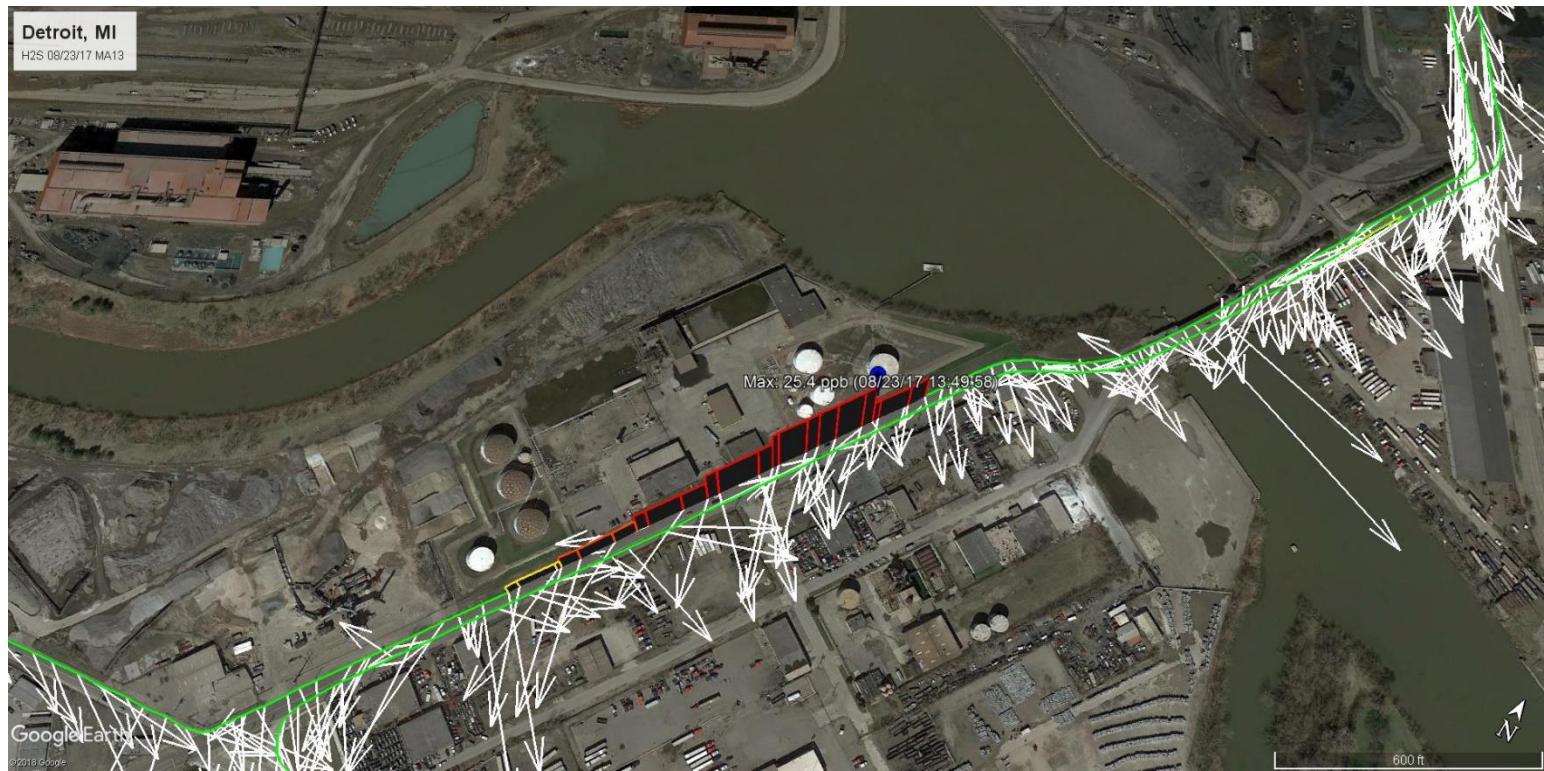


Figure 25: H2S Mobile Concentration Ribbon 08/23/17 MA13

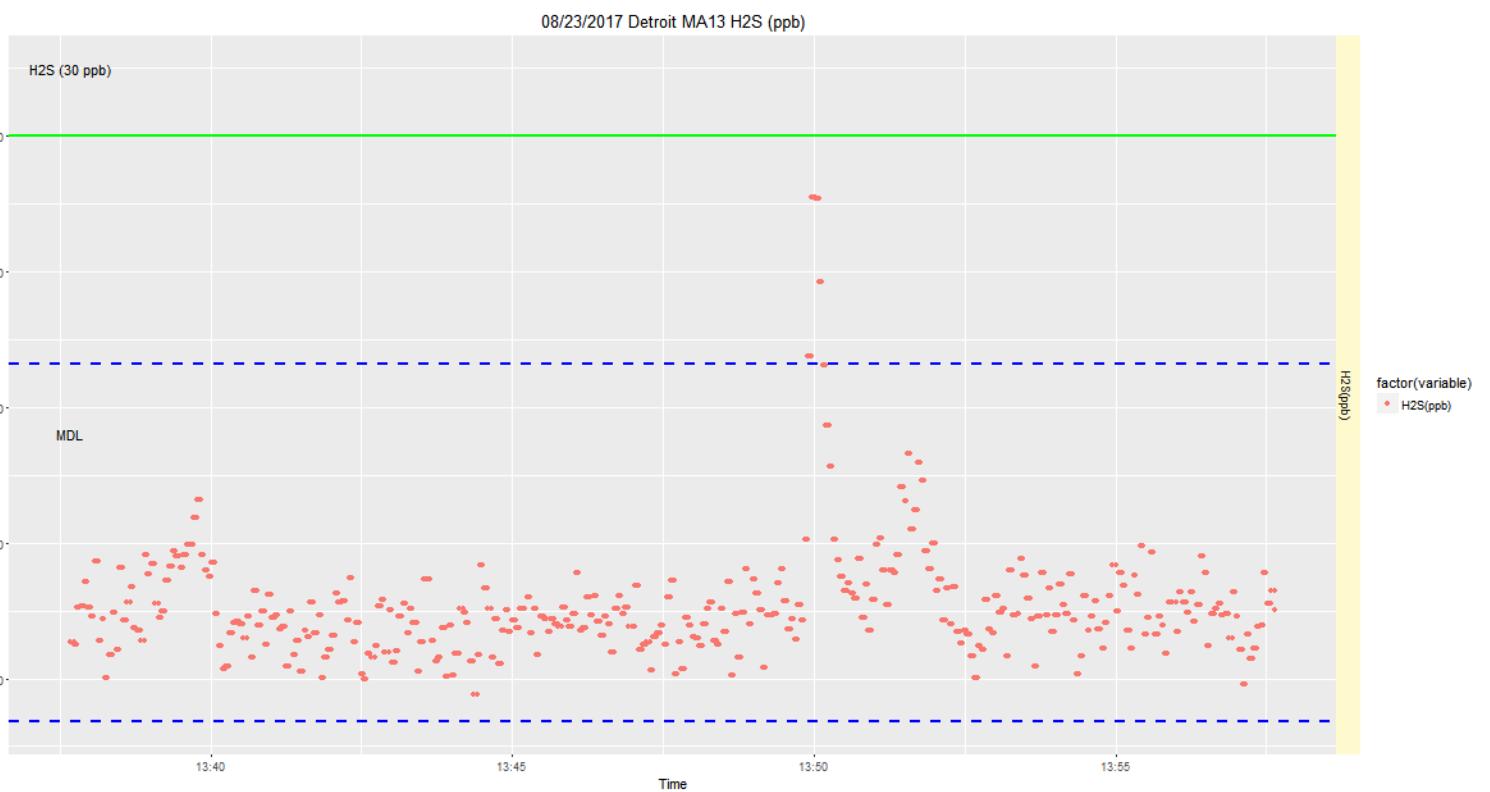


Figure 26: H2S Time Series 08/23/17 MA13

## DETROIT, MI GMAP MONITORING

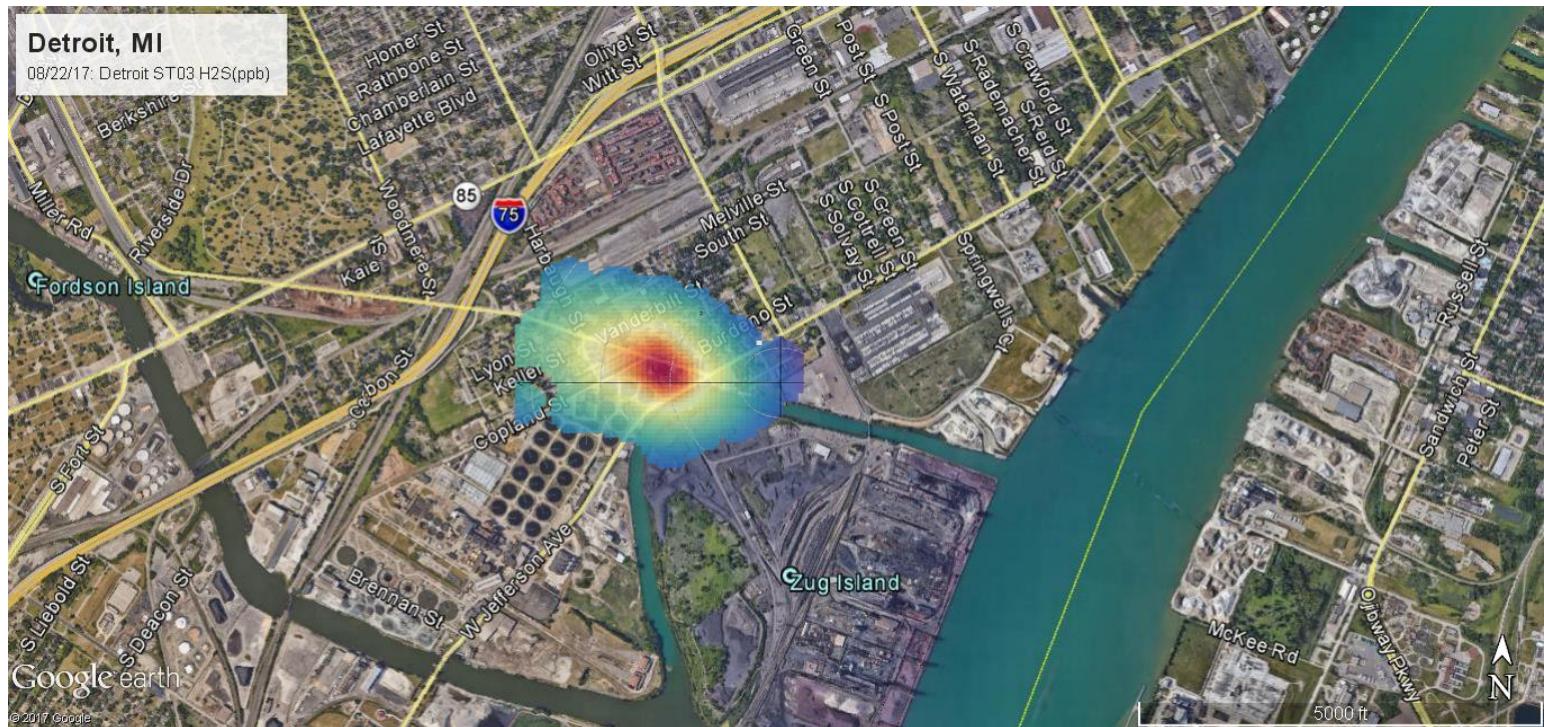


Figure 288: H2S Polar Plot 08/22/17 ST03

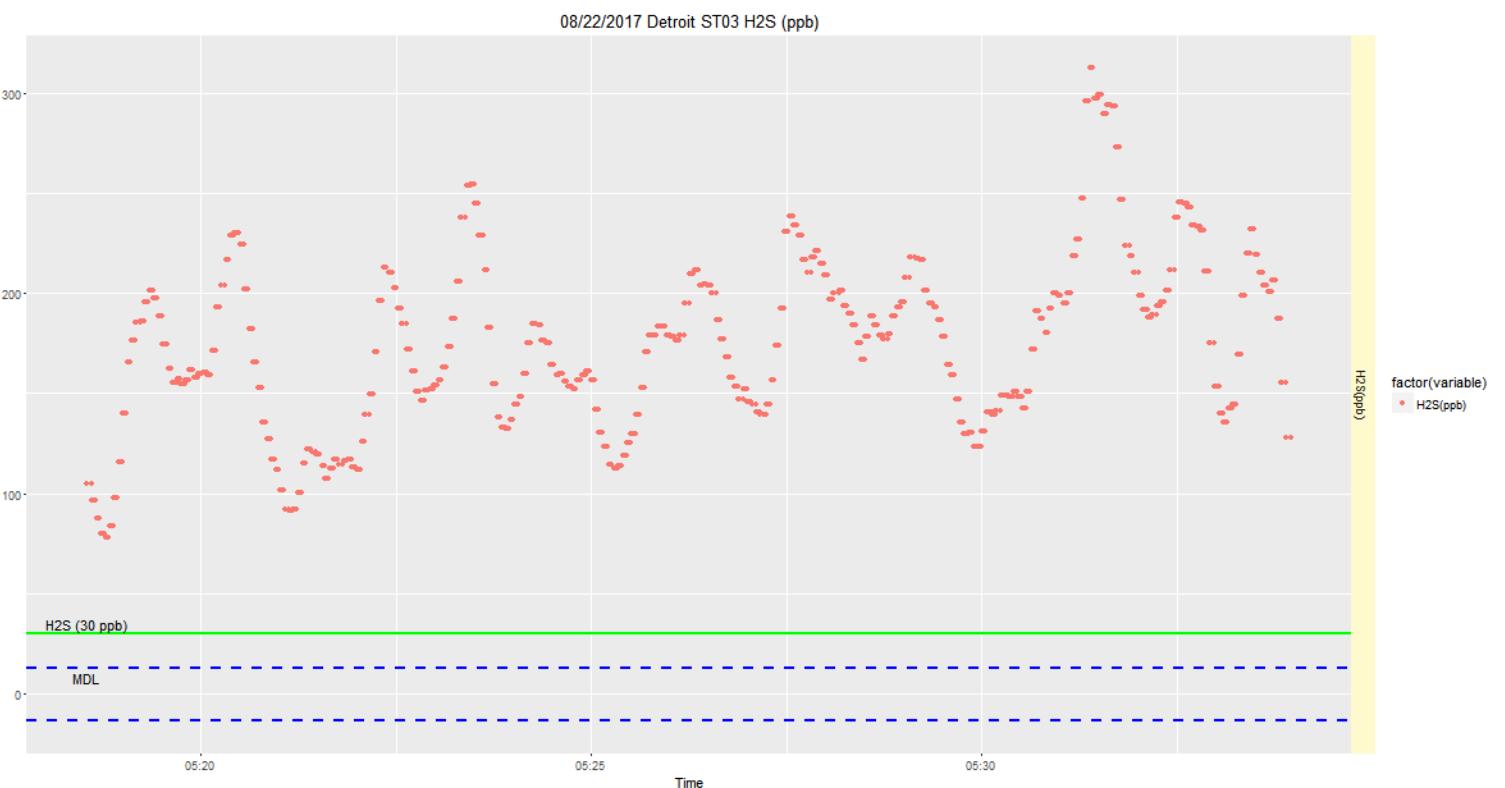


Figure 279: H2S Stationary Time Series 08/22/17 ST03

## DETROIT, MI GMAP MONITORING

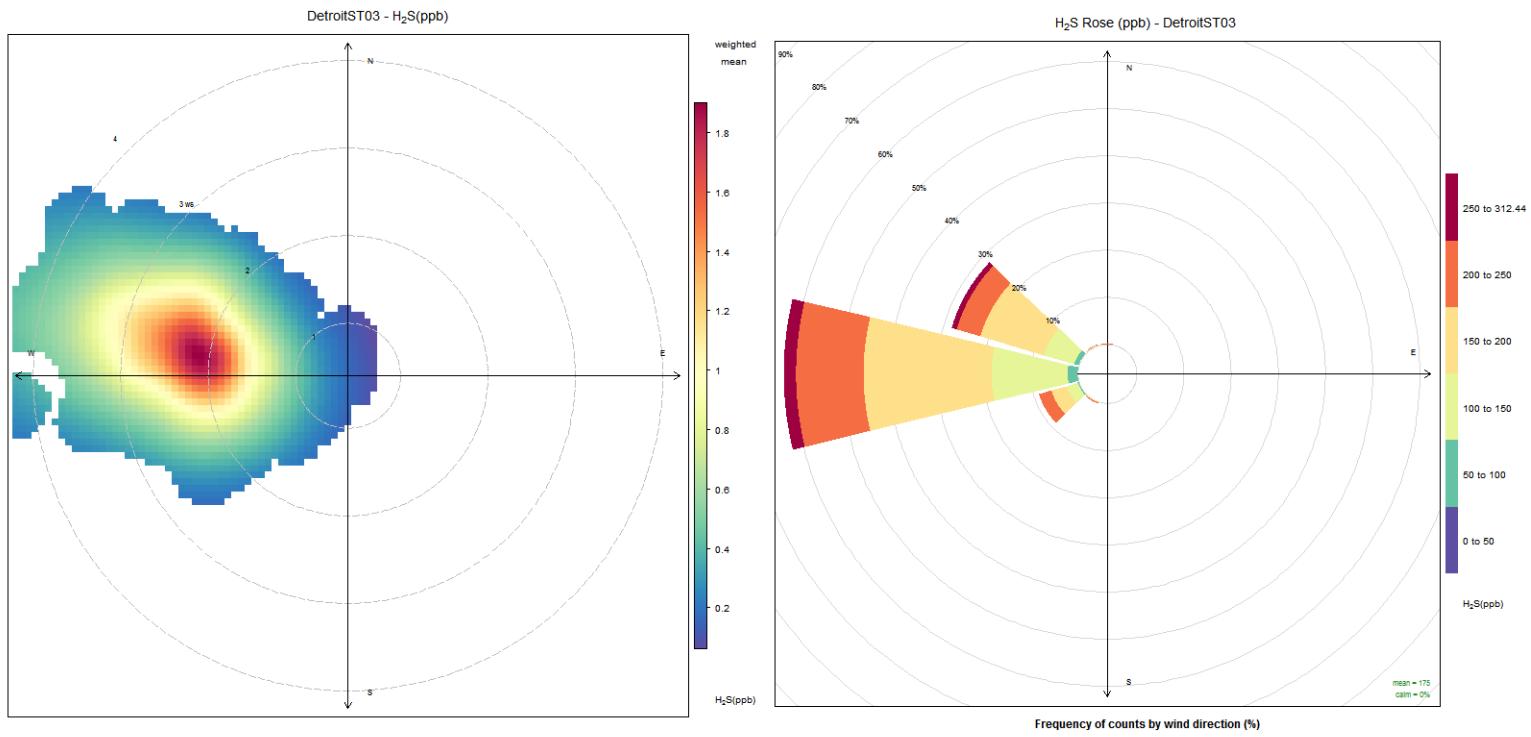


Figure 29: H<sub>2</sub>S Stationary Polar Plot and H<sub>2</sub>S Pollution Rose 08/22/17 MA03

## DETROIT, MI GMAP MONITORING

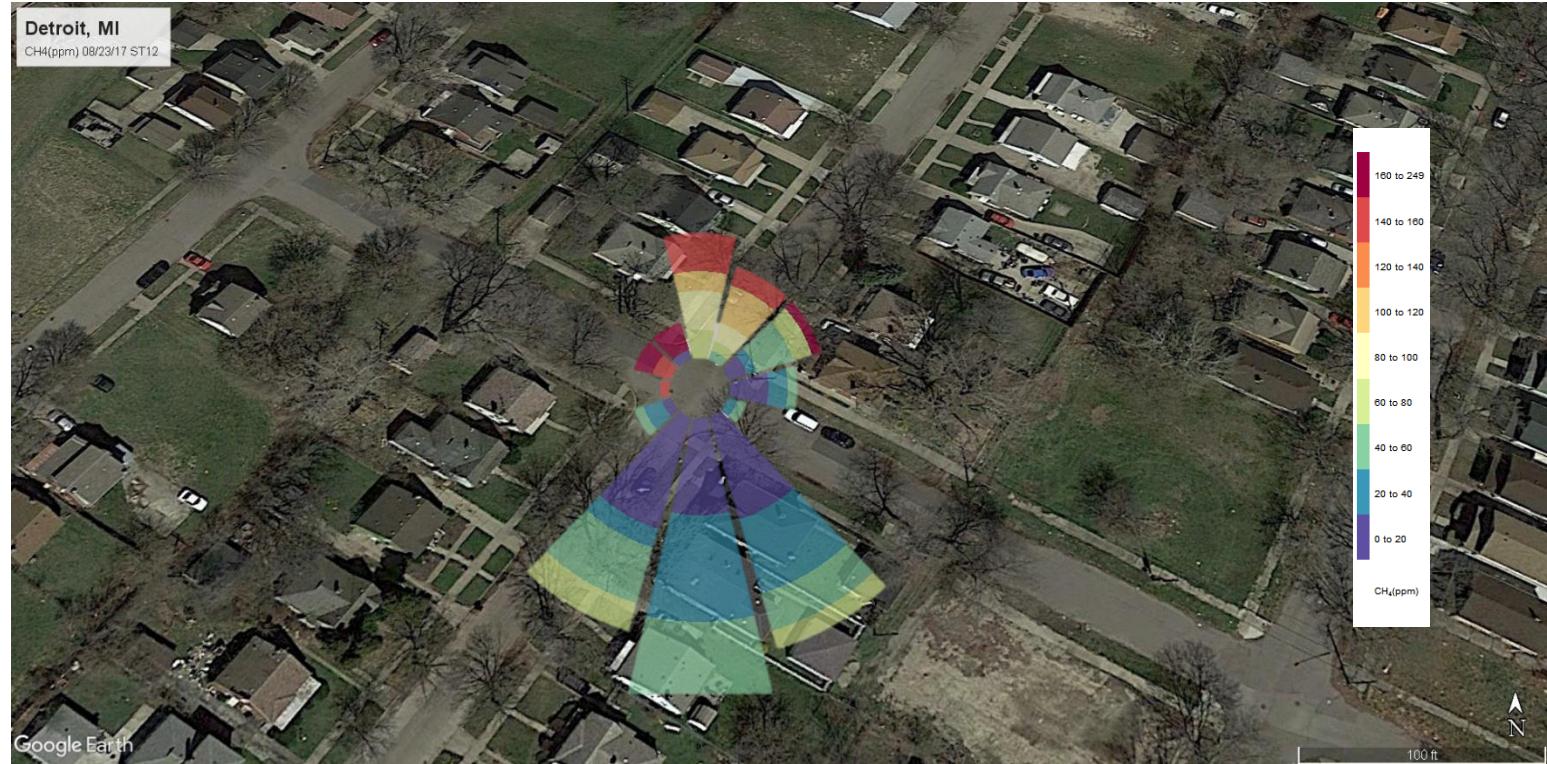


Figure 30: CH4 Stationary Pollution Rose 08/23/17 ST12